WATER WORKS & SEWERAGE

A GILLETTE PUBLICATION

EDITOR

FEBRUARY, 1938
VOLUME 85, No. 2

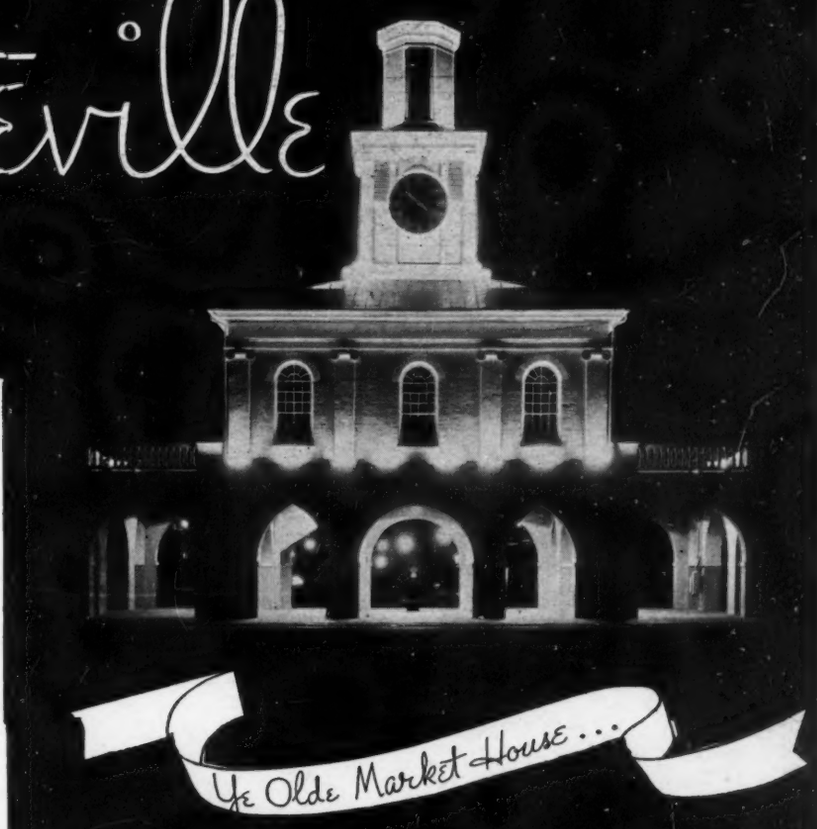
Fayetteville

Fayetteville, named in honor of General Lafayette, with her glorious history and wonderful climate, is the furthest Inland Port in the State of North Carolina, being located on the Cape Fear River at the head of navigation.

It is in the midst of a rich agricultural district, tobacco being one of the principal commodities produced. Cotton and rayon mills, box, veneer, brick and other manufacturing plants give employment to thousands. Fayetteville is a trading center for the district within a fifty mile radius.

"Ye Olde Market House" and nearby Fort Bragg, the nation's largest Field Artillery Post, are points of interest.

Fayetteville's bountiful water supply comes from four lakes with a reserve of 900,000,000 gallons. It is sand filtered from a water shed of eight miles in length and measured by Pittsburgh Water Meters.



Erected in 1838, stands in the center of the city on the original site of the Old State House, which prior to 1789 housed the North Carolina State Government and was the Capitol of the Commonwealth.

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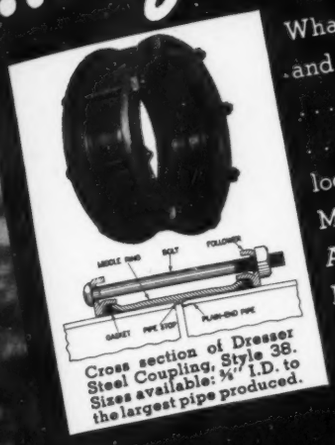

Cross section of Dresser Steel Coupling, Style 38. Sizes available: ¾" I.D. to the largest pipe produced.

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WATER WORKS AND SEWERAGE, February, 1938, Volume 85, Number 2. Published monthly at 400 West Madison Street, Chicago, Ill., by the Gillette Publishing Company. Per copy, 25c. Subscription rate, $2.00 per year; Canadian and Foreign, $3.00 per year. Copyright, 1938. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

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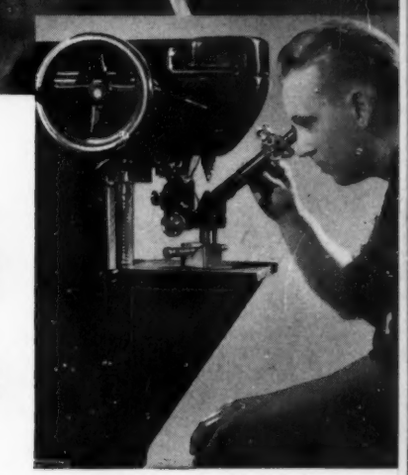
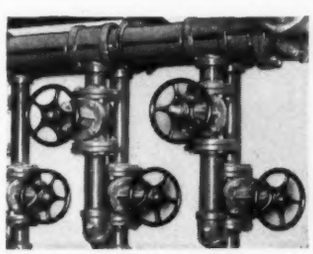


WHEN DIAMONDS TELL A HARD STOR

Each metal in a Crane valve must have th right degree of hardness for the part which plays. Above, you see a Crane Research Eng neer using an instrument of foremost desig and unquestionable accuracy, to measure th hardness of a valve stem to determine its bea ing qualities. Thus, Crane in another wa makes certain that what's inside counts.



WHERE THE LONG TEST BEGINS

Actual service is the surest test of valve quality. For three generations Crane has been building valves for the most exacting services, and this accumulated experience is the greatest aid to Crane engineers in making even the best valves a little better.

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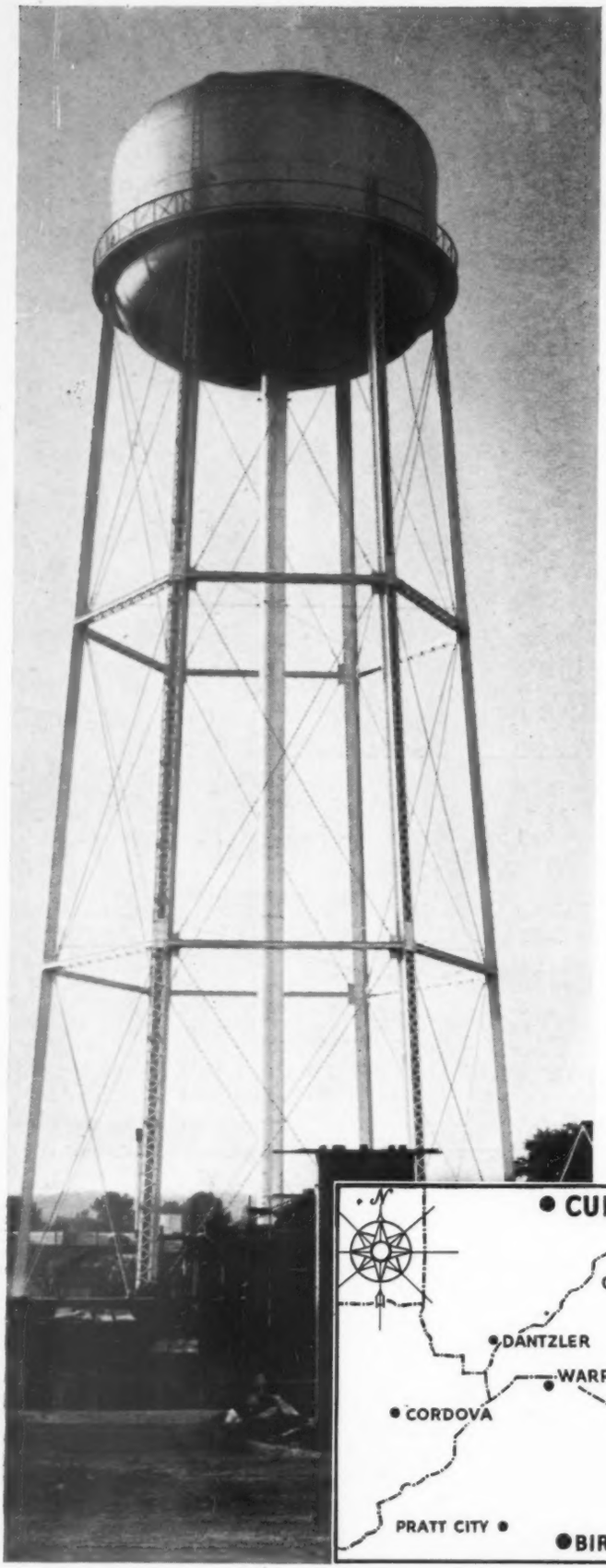
NATION-WIDE SERVICE THROUGH 134 BRANCHES AND MORE THAN 500 WHOLESALER

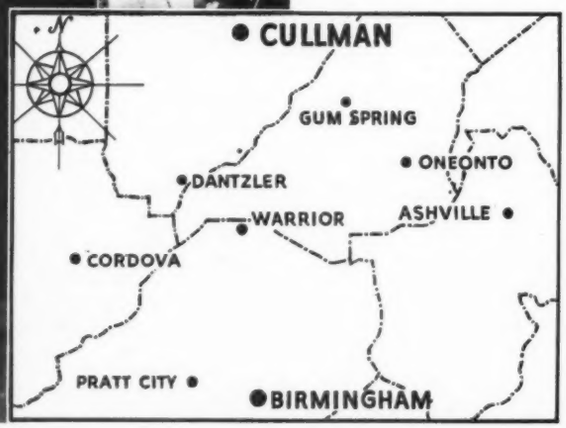


MODERN ELEVATED STORAGE *for Cullman, Ala.*

CULLMAN, ALABAMA, was recently faced with the problem of modernizing its water supply system. An important factor in this modernization program was the construction of the 200,000-gal. Horton elevated water storage tank illustrated at the left.

Before the installation of this tank, one of two steam pumps was in operation at all times, pumping directly into the distribution system. This resulted in inefficient operation with the pumping rate varying from a few gallons per minute during the night to approximately 1,000 g.p.m. during peak loads. After the tank was installed, it was possible to confine pumping to most favorable periods of the day with one pump operating at its most efficient rate. The consulting engineers, Polglaze & Basenberg, of Birmingham, Ala., have estimated that this one improvement in the water supply system has reduced Cullman's pumping costs 25 to 50%. This is a good example of the lower costs and improved service being secured in all parts of the country through use of Horton elevated storage.

Another tank now being fabricated for Cullman is a 400,000-gal. flat bottom raw water storage tank which is typical of another class of work regularly produced in our shops. We are always glad to give information and quotations on all types of tanks, reservoirs, large diameter steel pipe, smoke stacks, stand-pipes and other welded or riveted plate work. Address our nearest office.



The photograph at the left shows the 200,000-gal. Horton ellipsoidal - bottom tank that provides gravity pressure in the waterworks system at Cullman, Alabama. The map shows the location of Cullman with respect to surrounding cities.

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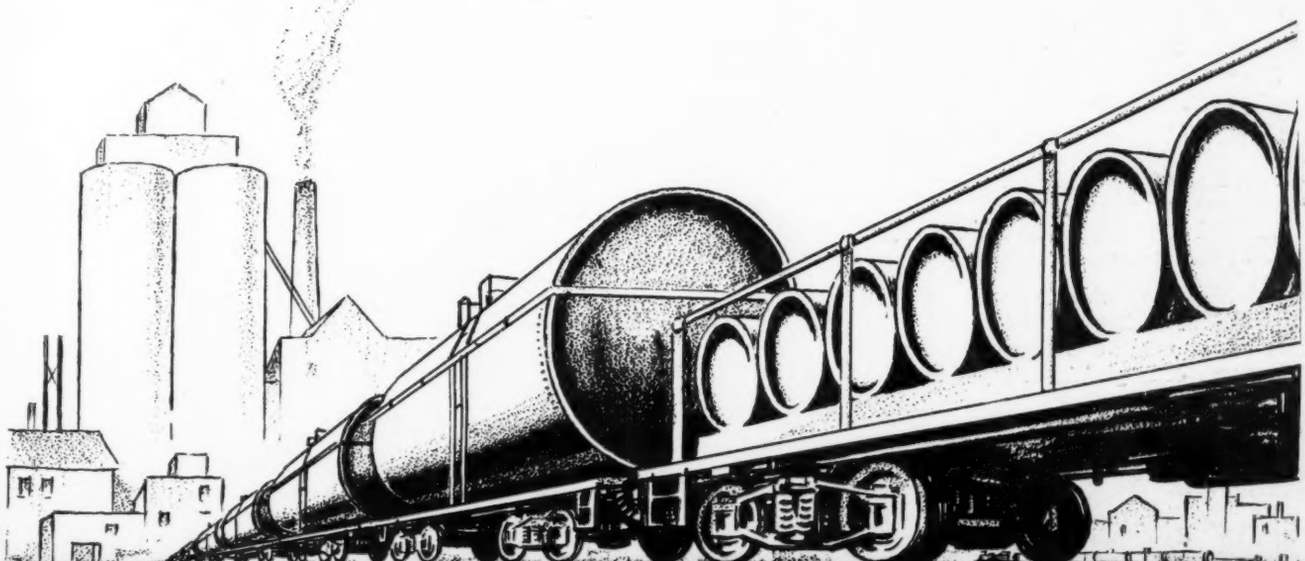

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HOW CHARLESTON'S NEW 18½-MILE TUNNEL WAS STERILIZED

CHARLESTON'S NEW TUNNEL TO THE EDISTO RIVER WAS BUILT THROUGH MARL FORMATION. NO LINING WAS USED.

JAMES E. GIBSON, Manager and Engineer of the Charleston, S. C., Water Department who had charge of the entire tunnel undertaking—the man who made Charleston's dream come true.

A JOB THAT CALLED FOR HTH

CHARLESTON citizens gasped when three far-sighted engineers proposed a tunnel to the Edisto River for the city's water supply. But that was back in 1853. A few months ago the last 18½ miles of that "impossible" 23-mile tunnel were sterilized and put in service; a 75-year old dream had become a reality.

How Charleston's own Water Department, under the generalship of James E. Gibson, built 23 miles of unlined tunnel through marl formation is a story of unusual engineering accomplishment. No innovation, however, was the well-tested method of sterilization selected for the completed tunnel.

"We gave the matter careful thought," writes Mr. Gibson, "and finally reached the conclusion that the use of High Test Hypochlorite was the most feasible and practical method of securing the desired results. We accordingly purchased from The Mathieson Alkali Works (Inc.) 500 pounds of High Test Hypochlorite."

Mr. Gibson then goes on to describe how the tunnel was sterilized, how the easily-transported hypochlorite was introduced in the tunnel at different points, how the water was first admitted from the Edisto River and then from Goose Creek and finally washed out into the Ashley River through the outfall gates at Shaft No. 12. Commenting upon the effectiveness of the sterilization, Mr. Gibson states that "bacteriological tests of the discharge from the shaft through the tunnel compared favorably with tests of the raw water in the river at the intake."

Water works men aren't often faced with the task of sterilizing such a stretch of tunnel. But Mr. Gibson's experience is typical of that of hundreds of others who have found HTH indispensable for all manner of special and emergency chlorination jobs, from treatment of an isolated well to chlorination of an entire reservoir.

Scores of just such unusual jobs, as well as many routine jobs, are discussed in detail in "Hypo-Chlorination of Water," an 80-page manual of practical information for water works officials. Send now for a copy of the new third edition.

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MAP SHOWING LOCATION OF TUNNEL AND ITS RELATION TO THE CHARLESTON PUMPING STATION, THE EDISTO RIVER AND THE ASHLEY RIVER

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Borough of Princeton	Princeton, New Jersey
City of Medford	Medford, Oregon
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Sewage Disposal Plant	De Pere, Wisconsin
Sewage Disposal Plant Harlem Valley State Hospital	Wingdale, New York
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WATER WORKS & SEWERAGE

E. S. GILLETTE, Publisher

L. H. ENSLOW, Editor

ARTICLES AND AUTHORS Scheduled for Future Issues

"Chloramination at Telsa Portal"—is the topic of an article by G. E. Arnold, Chief Water Purification Engineer, San Francisco Water Dept. The author tells of biological slime growths in San Francisco's new Hetchy-Hetchy aqueduct and tunne's, which we e al'eady seriously affecting the carrying capacity of the 18 miles of tunnel and 47 miles of steel aqueduct into San Francisco. Further; taste, odors, and corrosion, were factors of consequence due to the growths of sulfur and iron bacteria, and their subsequent death, decay and sloughing. Based on experimental studies the ammonia-chlorine treatment, at a far removed point up the aqueduct, was selected as the control scheme. The new "Chloramination" station at Telsa Portal, described by Mr. Arnold, has only recently been placed in operation. Unique features of design and operation of the Telsa Portal plant (2000 lb. chlorine and 400 lb. ammonia capacity per day), are presented. The choosing of the plant location was predicated on accessibility and the experimental findings.

"Contact Aeration in Sewage Treatment"—by **E. W. Steel,** Professor of Sanitary Engineering, Texas A. & M. College, relates experiences with a modification of activated sludge treatment by two distinct stages—the first a bio-flocculation stage followed by floc removal and, thereafter, the secondary (nitrifying) stage. Involved, is economical air consumption by employing up-flow air diffusion in tanks filled with a large area of surfaces, serving as contact media for the organic matter plating-out effect and thereby decolloidation of the sewage in the bio-flocculation stage. The first stage, producing by far the greatest amount of purification work per dollar expended in construction and power consumption, may or may not be followed by the nitrifying stage to meet seasonal conditions or subsequent increased stream loadings. Much can be said concerning the economies and possibilities inherent in bio-flocculation alone, or such aided by coagulants and effluent straining. A study of the Havs scheme. developed at Waco, Texas, and the subject of Prof. Steel's paper, throws added light on the feasibility of the method—particularly its flexibility and relative costs.

Dr. Willem Rudolfs, Chief of New Jersey's Water and Sewage Experimental Station, contributes an eye-opening review of the outstanding accomplishments in the direction of construction of sewage treatment plants, to systematically clean up the domestic pollution within three of the most densely populated river valleys of New Jersey. Dr. Rudolfs' survey of accomplishments reveals the types of plants, together with an analysis of costs per capita and per m. g. capacity. Many pert'nent facts appear in his presentation and the unique and most interesting features of the several plants are emphasized. The doctor closes with the major question before stream pollution authorities today—"Now what about industrial pollution?" as the next needed step in restoration of stream stability and water safety to reasonable degrees.

Vol. 85, No. 2

CONTENTS for FEBRUARY, 1938

Progress in Sewage Treatment During the Year 1937 81
By ELSON T. KILLAM
Consulting Engineer, New York City

Cleaning Filters With Sulphur Dioxide 90
By J. G. PATRICK
Chemist, West Virginia Pulp & Paper Co., Luke, Md.

Grease Separation Enhanced by Aero-Chlorination 97
By C. E. KEEFER and E. C. CROMWELL
Bureau of Sewers, Baltimore, Md.

New Orleans in Spring! With A.W.W.A. in Action 100

Annual Winter Meeting of New York State Sewage Works Association 107

For President of A.W.W.A.: Reeves Newsom 114

Reclaiming and Cement Lining Old Cast Iron Pipes 117
By WILLIAM S. STAUB
Engineer, West Va. Water Service Co., Charleston, W. Va.

Meeting New Jersey Association of Professional Engineers 123

Editorial 125

Equipment News 126

With the Manufacturers 127

Meetings Scheduled 128

Catalogs and Literature Received 129

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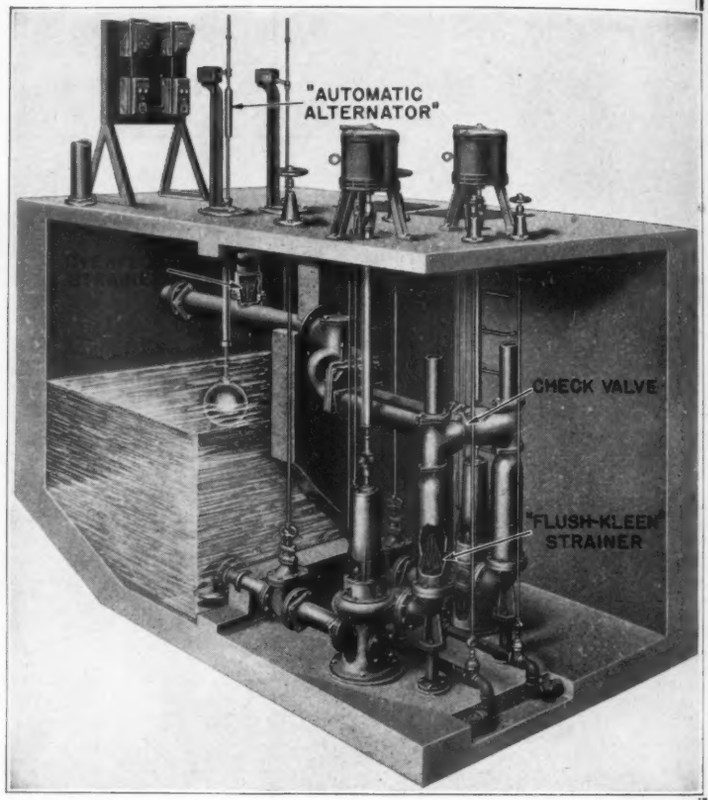

Fig. 2038—Duplex Open-Shaft "Flush-Kleen." Most reliable sewage pump made. Automatic Alternator transfers operation from one pump to the other.

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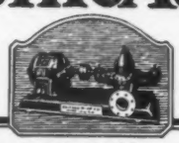

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WATER WORKS AND SEWERAGE
A GILLETTE PUBLICATION
VOL. 85 FEBRUARY, 1938 No. 2

PROGRESS IN SEWAGE TREATMENT DURING THE YEAR 1937

By ELSON T. KILLAM

*Consulting Engineer,**
New York City

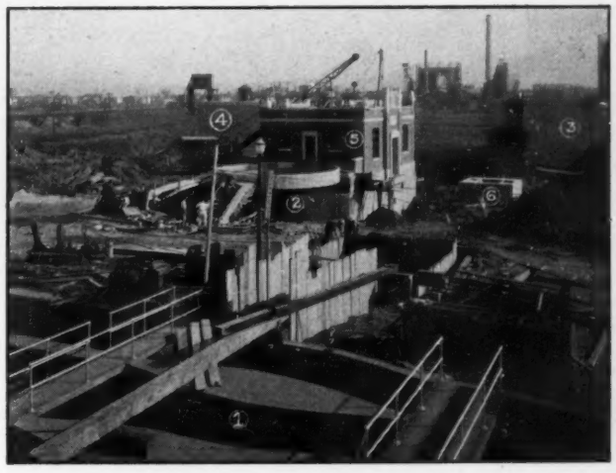
The Author

THE year 1937 has been outstanding in sewage treatment progress, particularly emphasized by the very considerable number of new plants which have been placed in service. Numerous projects delayed for several years by municipal financial difficulties have now been carried to completion. And, an impressive number of plants, planned and undertaken under pressure to meet the December, 1935, deadline for PWA acceptance, have been completed during the past year.

Outstanding progress has been made on the two largest current sewage disposal programs in the country; that of the Chicago Sanitary District, and that of New York City; and treatment plant construction has been unusually active throughout all sections of the country.

Progress in the art, as such, has been marked more particularly by refinements of, and innovations in, various specific phases of general methods, rather than by the introduction of complete new methods.

The high points of the year's activity from the standpoint of type of plants installed, include the installation of a number of activated sludge plants of great magnitude, and the construction of many chemical-mechanical plants of varying size.



Sludge Works of the Joint Treatment Plant of Elizabeth, N. J. (Alexander Potter, Engr.) (1) Transition Flumes Below Grit Chambers; (2) Sludge Thickening Tank; (3 and 4) Sludge "Reservoirs" with Floating Covers, Feed to Barges; (5) Sludge Pump House; (6) Sludge Line Flushing Station, the Most Important of the Units Involved in Sludge Transfer.

*Hydraulic and Sanitary Engineer, 142 Maiden Lane, New York City.

The New Treatment Works of the Nation's Capital Gets to Hitting on All Eight. Boasts First Sludge Elutriation Plant; America's Largest Sludge Gas Engine; Forced Draft Odor Collection to Central Station and Exhaust Stack; Plutocratic Laboratories. In Foreground, Power Station; on Left Laboratories.

Perhaps the most active and important phase of sewage treatment developments during the past year has been the major increase in adoption of mechanical dewatering of sludge, and its incineration. Complete or adequate sludge disposal, long one of the most troublesome phases of sewage treatment, may be credited with marked accomplishment in this recent period. The year 1937 moreover, has been notable in producing a considerable fund of actual operating data on various types of chemical-mechanical plants installed in the two previous years; whereas, in former years such data were primarily confined to a limited number of sources from scattered test plants.

With the recent cessation of the PWA stimulus a change in pace seems inevitable; but it is hoped that progress in sanitation, which has only been well started by the increased activity of recent years, will continue to receive deserved attention.

The present variety of methods available and the demonstrated performance of innovations of compara-

The Ward's Island Project of New York City Is Completed at a Cost of $30,000,000 *to Start Operation Late in* 1937.

tively recent introduction, provide far greater leeway to effectively and economically meet pollution abatement requirements than have heretofore been available. Many municipalities have long deferred action upon the basis that primary treatment was inadequate, and the more costly complete treatment was beyond the range of available finances. The selective variety of facilities now available, to provide various degrees of treatment, should encourage many such municipalities to proceed on a satisfactory and economically feasible program. These factors should provide the necessary stimulus for continued progress, which may be limited in many cases to the immediate construction of works providing at least for partial treatment but designed for future amplification.

Major Projects

Chicago: The Southwest Plant of the Chicago Sanitary District has been markedly advanced during the past year and the last major uncompleted unit, the sludge incineration and power plant building, is being rushed to completion. This plant, the largest in the country, provides activated sludge treatment for a flow of 400 m.g.d., with provisions for sludge drying, sludge incineration and power generation, by mutual assistance.

New York City: The Ward's Island Plant in New York City was formally dedicated on October 23, 1937. This plant—providing activated sludge treatment for a flow of 190 m.g.d., was constructed at a total cost, including the Manhattan and Bronx interceptors, of approximately $30,000,000. Started in 1931, and essentially constructed during the past two years, this plant represents the first and largest major unit in New York's long deferred and sorely needed program for elimination of pollution of its tidal waters, and marks an important step in the present program contemplating the construction of some 38 plants in the New York area. The Ward's Island plant, designed in 1928, comprises a more or less conventional design for activated sludge, and also includes docking facilities for self-propelled barges which will be utilized to transport mixed raw primary and excess activated sludge to sea.

The Tallmans Island Plant in New York City, a 40 m.g.d. activated sludge plant estimated to cost $4,100,000, was undertaken during 1937 and construction is being rushed in order to complete the plant before the opening of the New York World's Fair, the site of which is within the tributary area. Sludge disposal facilities at this plant include digestion, with sludge gas utilization for driving pumps and blowers, together with thickening equipment and facilities for barging to sea.

Buffalo: The Buffalo, N. Y., project, involving a total cost of $13,000,000, for storm relief sewers, interceptors and sewage disposal, construction of which began in June, 1936, has progressed rapidly and is scheduled for completion during the coming year. The treatment plant, designed for a population of 750,000, provides plain sedimentation with partial digestion, vacuum filtration, and incineration of sludge, with a total estimated cost of $4,400,000.

Washington: The Washington, D. C., plant provides primary treatment for a capacity of 130 m.g.d. Constructed at a cost of $3,600,000, this plant provides grease separation, sedimentation, sludge digestion, with utilization of gas for power (largest American gas engine at a sewage works), together with elutriation and vacuum filtration of sludge.

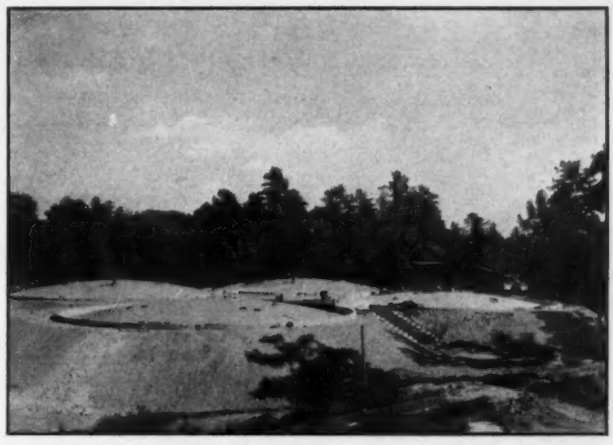
Elizabeth: The Joint Meeting Plant, Elizabeth, N. J., serving 11 municipalities in the Elizabeth and Rahway River valleys, providing primary treatment for 100 m.g.d. and constructed at a cost of $1,100,000, was placed in operation in June, 1937. Two traveling crane type sludge scrapers and scum removers, electrically driven from third rails, serve four large settling tanks by means of transfer provisions. Sludge, after thickening and storage, is barged to sea.

Rahway: The Rahway Valley Joint Meeting Plant, Rahway, N. J., dedicated in October, 1937, represents another district plant constructed by a group of municipalities. This plant serves seven municipalities in the Rahway River valley and provides sedimentation, sludge digestion, and drying on sand beds, a portion of which are glass covered.

Denver: The Denver, Colorado, plant, with a maximum flow rated capacity of 80 m.g.d., will provide complete facilities for chemical treatment and will include effluent polishing through magnetite filters, and separate sludge digestion. The total estimated plant cost is $1,276,000.

Atlanta: The Atlanta, Ga., project will provide relief from conditions of heavy stream pollution in the Atlanta Metropolitan District by the construction of a number of new plants. The Clayton plant of 40 m.g.d. capacity includes sedimentation, supplementary chemical treatment, with separate sludge digestion, and vacuum filtration. The Intrenchment Creek plant involves reconstruction of the old Imhoff trickler plant to 14 m.g.d. capacity, with sedimentation, secondary sedimentation, magnetite filters, and separate digestion. The South River plant of 6 m.g.d. capacity provides sedimentation, separate digestion, trickling filters, and secondary tanks; while the Utoy Creek plant of 1.5 m.g.d. capacity includes primary treatment with separate sludge digestion.

Minneapolis-St. Paul: The Minneapolis-St. Paul project will provide a plant of extremely flexible design to meet wide variations in run-off, and will have a capacity for 134 m.g.d. average flow, with provisions to handle 610 m.g.d. through screens and grit chambers. Plant facilities include sedimentation, chemical treatment, flocculation, and magnetite effluent filters of the downward flow type. Sludge disposal works include concentration, vacuum filtration, and incineration, and are designed for 76.5 tons average dry solids during operation on plain sedimentation, with a maximum capacity of 295 tons per day during peak conditions, and with chemical treatment. Screenings will be dewatered by a centrifugal machine.



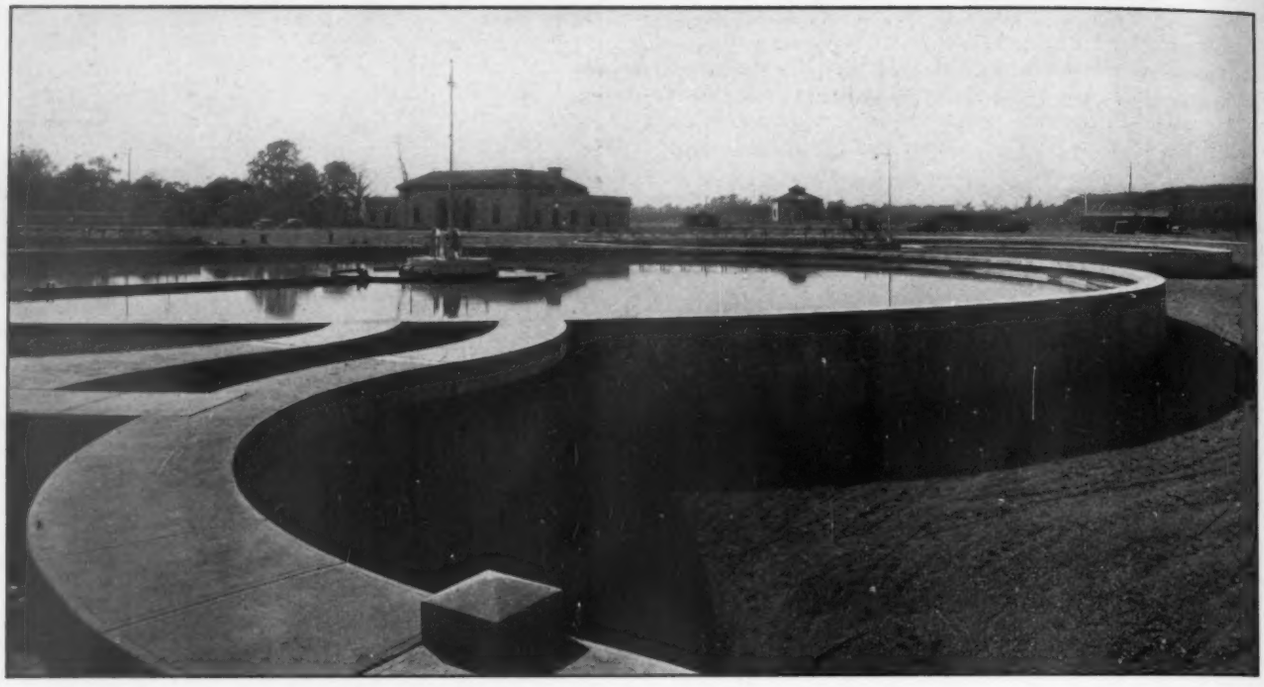
At Atlanta's New Main (Clayton) Plant—42 M.G.D. These Four Dorrco Multidigestion Tanks (90 ft. dia.) Represent the Largest Such Installation. (Wiedeman & Singleton, Engrs.)

At the Elizabeth, N. J., Plant. One of Two Crane-Type Link-Belt Traveling Sludge Scrapers and Skimmers Which Being Movable From Tank to Tank Serve Four Rectangular Primary Tanks.

Cleveland, Ohio: Cleveland has recently completed additions and enlargements to its existing Southerly and Westerly treatment works. The new Easterly plant, recently completed, is an activated sludge plant of 110 m.g.d. capacity. Amongst many unusual features are two 54-inch comminutors. The sludge and screenings problem is transferred to the Southerly works, by pumping thereto all sludge and comminuted screenings produced, through a C.I. force main some 12 miles long. At the Southerly plant the combined sludges are to be partially digested to provide gas as required and to reduce the solids to be vacuum filter dewatered and incinerated, as the final method of complete disposal. Involved are four 100 ton/day multiple hearth incinerating units. Two such sludge cake destruction units of 50 tons/day capacity are also being provided at the revamped Westerly primary treatment works.

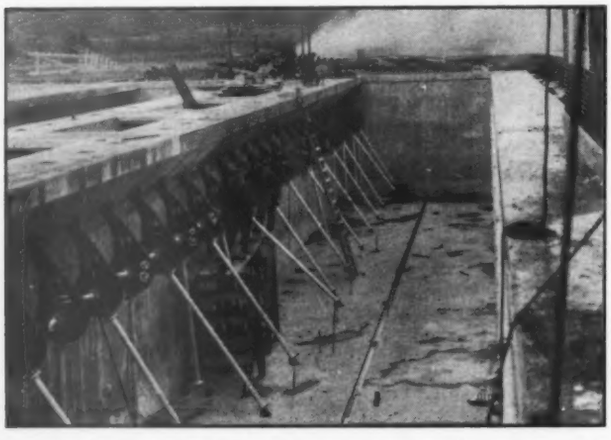
At the latter plant grease removal constitutes a problem. Here "aero-chlorination" is being provided, for the first time on a large scale ahead of sedimentation, to boost grease removal efficiencies of the air blowing process. The new method involves introduction of dry chlorine gas (1 to 3 p.p.m. chlorine based on sewage flow) into the air header beyond the compressors. In this, ordinary cast iron headers with rubber lined drop-pipes are being provided to preclude possible corrosion below the water line.

At the Southerly treatment works (originally an Imhoff tank-sprinkling filter plant) between the settling units and the filters have been added aeration units for bio-flocculation, if not complete activation, by stepped or tapered air input. The iron content from industrial wastes in the Southerly sewage may well prove helpful rather than a hindrance in this method of curbing odor nuisance and materially boosting rates through the trickling filters, without adding area thereto. To intercept the floc particles passing through the filters, operating under higher



The Cluster of New Center-Feed Primary Clarifiers (170 Ft. Dia. Each) at Baltimore, Md. In the Rear Is the Meter and Sludge Control Building, in the Background the New Covered Stage Digesters. (Whitman, Requardt & Smith, Engrs.) (Photo—Courtesy the Dorr Company.)

rates; and in lieu of the final settling tanks, now converted to aeration units, automatically self-cleaning magnetite strainer units are being installed for the purpose of producing a polished effluent. The revamping is so thoroughly designed as to render the plant a full scale experimental works subject to operating as a sprinkling filter and activated sludge plants in parallel, or in a series combination involving activation or bio-flocculation ahead of the filters. The aeration units are equipped with swinging diffuser tubes and "Aloxite" plates in units, subject to parallel or series operation, for evaluation of tapered aeration efficiencies by each method. Reaeration of returned sludge may be of long or short periods as demonstrations determine most effective. In short, the Easterly plant may be considered America's No. 1 full sized experimental sewage plant of many novel features.



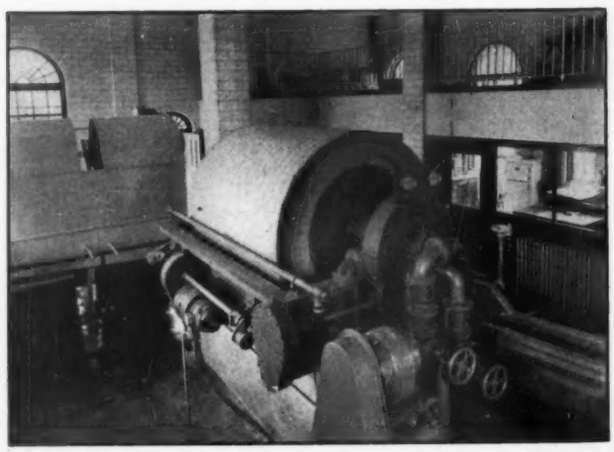
At Cleveland's Southerly Plant. An Aeration Unit Being Equipped with Chicago Swinging Tube Diffusors for Stepped or Tapered Aeration. Parallel Tanks Are Equipped with "Aloxite" Diffuser Plates Also to Provide Tapered Aeration.—See Text.

Hartford: The Hartford, Conn., plant is scheduled to go into operation early in the current year and will provide primary treatment at a cost of approximately $1,500,000.

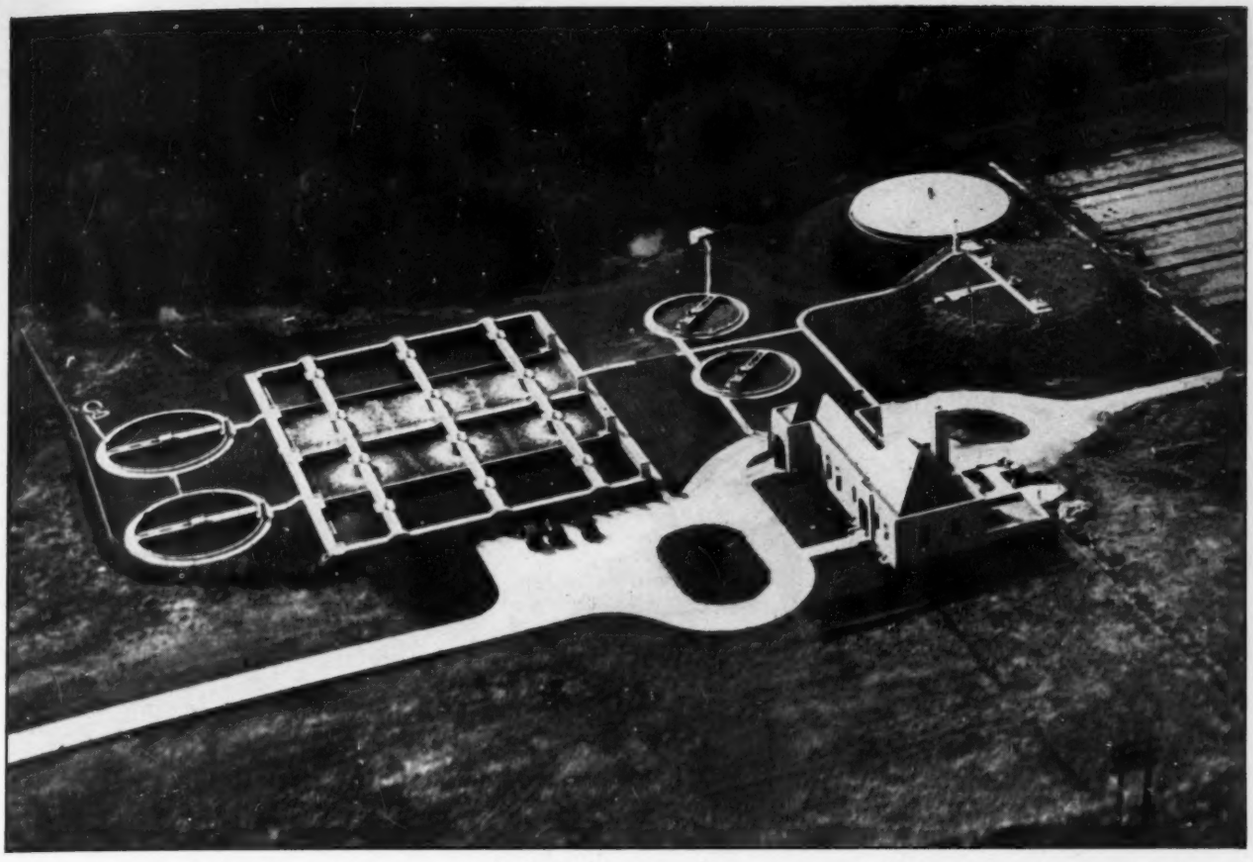
Many other cities have installed new plants of no less importance than the foregoing. The **Columbus, Ohio,** plant includes activated sludge treatment, continuous centrifugal sludge concentration, digestion, gas utilization for power, and vacuum filtration. **Baltimore** has recently started construction of a large plant providing activated sludge treatment, with sludge thickening and digestion, elutriation, and vacuum filtration of sludge. A new plant for **San Francisco** will provide sedimentation aided by flocculation (with or without chemicals) and with chlorination and separate sludge digestion.

Raritan and Fox River Valley Projects Notable

In addition to the foregoing large scale projects, several notable programs for river cleanup, involving the more or less simultaneous construction of independent plants by neighboring municipalities along a stream, have



At Middletown, Conn.—Typical of Vacuum Filters "Fordized" for the Smaller Plants, Is This Oliver Unit.



The New Activated Sludge Plant of Elmhurst, Ill. (Alvord, Burdick and Howson, Engrs.) (Photo—Courtesy The Dorr Company.)

been substantially consummated. In the Raritan Valley, New Jersey, several plants have been completed in a program involving an expenditure of some $4,000,000 for a treatment of a total of 30 m.g.d. of sewage and wastes, and a population of 200,000 persons. A total of 13 plants including two primary, eight chemical-mechanical, and two trickling filter plants, are involved in this comprehensive program.

In the Fox River Valley of Wisconsin, heavy pollution from sewage and paper mill wastes has been removed by the installation of 9 plants located at Appleton, Green Bay, DePere, Kaukauna, Little Chute, Neena-Menasha, Oshkosh, Wrightstown and Kimberly. The estimated total population served is 139,300, and the total estimated cost including plants and interceptors is $4,835,000. Many of these plants include primary treatment with auxiliary equipment for chemical treatment during periods of low run-off.

Sludge and Screenings Disposal

Various methods of sludge disposal, including multi-stage digestion, thickening, mechanical dewatering and incineration, have constituted a notably important part in 1937 activities. Interest in these developments has materially aided progress in this difficult phase of sewage treatment.

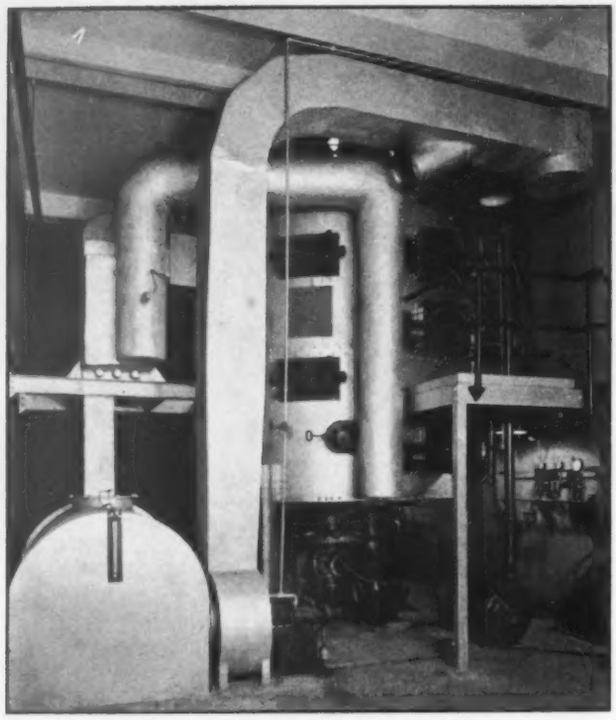
Multi-stage digestion, affording a marked increase in control of digestion and improved supernatant liquor, has been adopted in many plants of recent design.

Vacuum filters have been installed in far greater numbers than ever before. The total filter area installed during the period 1936-1937 is believed to exceed the total combined area installed in the previous decade. Improved operating results, leading to modified design requirements and marked reduction of horsepower, and the introduction of self-contained units, have led to the use of this method in increasing numbers of smaller plants. The feasible range of plant size for this method of sludge dewatering has thus been greatly extended. Accumulative experience with chemical conditioning has resulted in increased sludge loadings. Experience, with an increasing variety of types of sludge, has broadened the application of and increased confidence in this method of dewatering.

Centrifugal machines have been further introduced. A large unit at Toronto has now completed 18 months' performance on mixed digested, primary and activated sludge. A unit has been installed in the Jamaica plant in New York City for the dewatering of fine screenings, and a third unit is under construction for dewatering screenings at the St. Paul-Minneapolis plant.

A continuous centrifugal machine, of somewhat modi-

At Topeka, Kans. The Primary Treatment Works Have Been Converted to an Activated Sludge Plant. Final Settling Tanks Equipped with Rex Tow-Bro Sludge Removers. Aeration Tanks on Left; Waste Sludge Concentration Tank (a Special Feature)



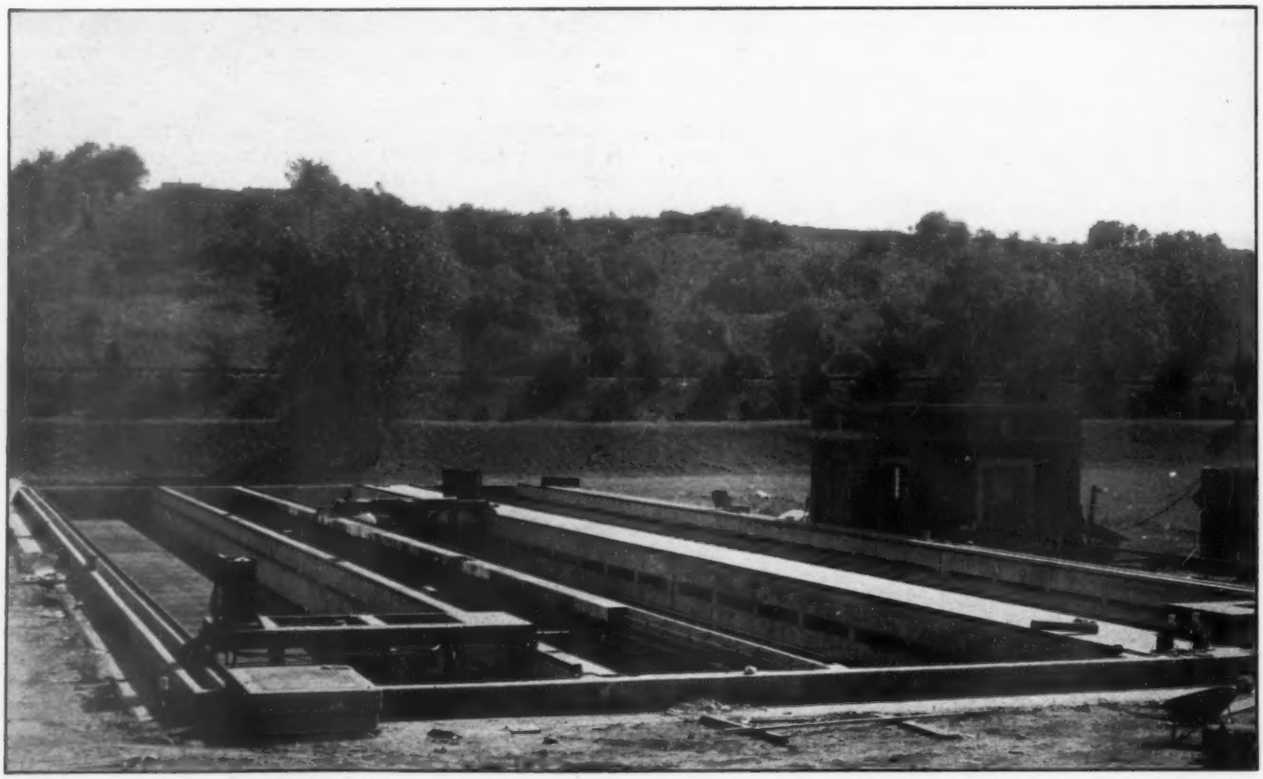
The Multiple-Hearth Rabbling Type Sludge Incinerator at Middletown, Conn.—One of the Smallest Incinerators of This Style Yet Installed. (Thos. F. Bowe, Engrs.) (Photo—Courtesy Nichols Engr. Corp.)

fied design, for the effective concentration of activated sludge going to digesters or being returned to the sewage, has been investigated and further experience along these lines will be watched with great interest, due to the important possibilities potential to such equipment. This type of equipment is being included in the new Columbus, Ohio, plant.

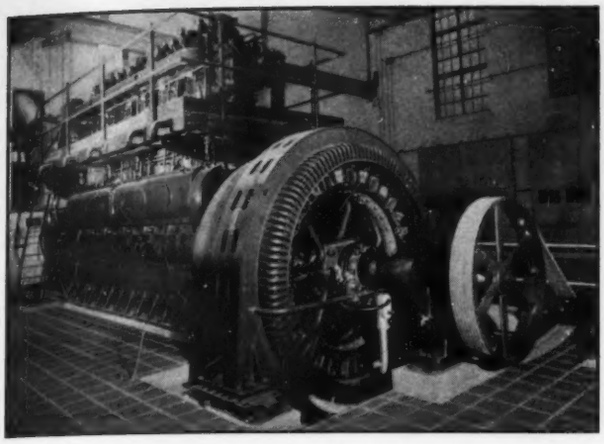
Methods for concentrating sludge have received far more attention than in former years, and thickening by coagulation and by mechanisms have been featured in several plant designs, including the Joint Meeting Plant at Elizabeth on raw sludge, the Tallmans Island, N. Y., Topeka, Kansas, and Baltimore plants, on activated sludge before delivery to digesters.

The incineration of sewage sludge, demonstrated by continuous plant operation prior to 1936 solely at Dearborn, Michigan, has been included in an impressive number of recent plants. Multiple hearth type incinerators have during the current year, been placed in operation or installed at Elmira and Auburn, New York; at New Britain and Middletown, Conn.; at Kaukauna, Wis.; at Kokomo, Ind.; Colorado Springs; LaPorte, Ind.; Greece, N. Y.; Conshohocken, Pa.; Barberton, Ohio; and at the Southerly and Westerly Plants at Cleveland. Units of similar construction have been installed for the incineration of screenings at Milwaukee and Niagara Falls.

Equipment for incineration in two stages, or (that is, drying in suspension followed by combustion in a separate chamber) has completed 18 months' operation at the Calumet plant of the Chicago Sanitary District. Similar equipment is being installed at Chicago's Southwest Plant, and a plant with this type of equipment was put into operation in November at Neenah-Menasha, Wis., for drying and incineration of raw or digested solids from sewage and paper mill wastes, produced by plain sedimentation or chemical treatment. The new Buffalo plant will likewise have equipment of this type. Bids have recently been taken at Tenafly, N. J., on this type of equipment in conjunction with a plant for the incineration of garbage and rubbish. Here the excess incinerator heat will be utilized in the drying, or dry-



Three Magnetite Filters (16x129 Ft.) of the Down-Flow Type—Southerly Works of Cleveland, Ohio. These Units Will Polish the Effluent From Trickling Filters. A Similar Installation Is in Atlanta's Revamped 25 Year Old Plant. (Geo. B. Gascoigne & Associates, Engrs.)



America's Largest Sludge Gas Engine Is No Mere Toy. Develops Better Than 1000 B.H.P. to Exceed Guarantees, at New Washington, D. C., Plant.

ing and incineration, of raw activated sludge cake from vacuum filters, plus fine screenings.

Sludge Utilization

Utilization of sludge for soil enrichment by the addition of humus, with accompanying fertilizer properties, has been subject to revived interest. A voluminous report, of recent date, has been issued by the Committee on Sewage Treatment of the A.P.H.A. upon this matter. With the development of suitable drying and shredding equipment, the major objections which have deterred more general utilization of sewage sludge for fertilizer, namely, the normally high moisture, the unwieldy condition for assimilation in the soil, and the consequent high handling cost, may be largely offset. In this event an interesting, although heretofore generally unimpressive phase of sludge handling may assume major importance.

Gas Utilization and Power Production

Activities in the past year reveal a substantial increase in the utilization of sludge gas for power production. A survey of the current year includes 31 plants, with 7,022 total installed horsepower, generating power from sludge gas. Earlier installations at Springfield and at Peoria, Illinois, where special electrical controls interconnecting with the power supply are featured; and installations at Aurora, Ill., Los Angeles County, Fort Atkinson, Wis., and Coney Island, N. Y., Washington, D. C., Cedar Rapids, Ia., as well as Durham, N. C., and elsewhere, have provided valuable operating data as a basis for improved design and operation, and more effective utilization.

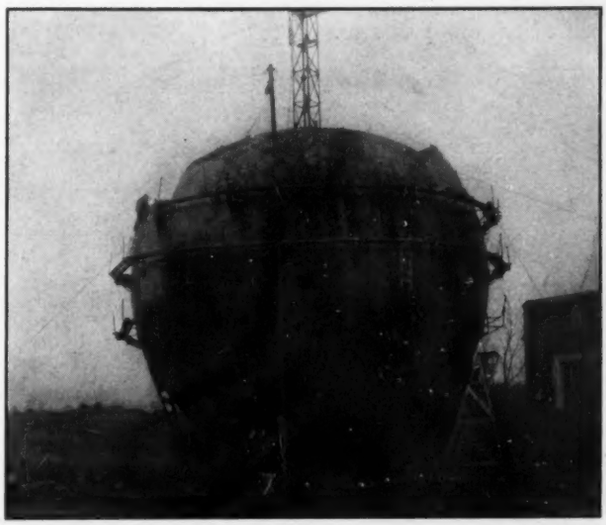
The Raymond System Sludge Cake Drier and Incinerator at the New Neenah-Menasha, Wis., Plant. The Adjacent Flash-Drier, Preceding the Incinerator, Is Not Shown. (Greeley and Hansen, Engrs.) (Photo—Courtesy Combustion Eng. Co.)

The 40 m.g.d. Clayton plant at Atlanta will have three gas engines with a total of 180 H.P. The 40 m.g.d. Tallmans Island plant will have 8 gas engines totalling 3,500 H.P. At the Washington, D. C., plant a 1,200 H.P. internal combustion engine, driving a 1,000 k.v.a. generator, constitute the largest single unit.

Chemical Treatment

Marked progress has been made in chemical-mechanical treatment as designed and installed, with full use of modern mechanical facilities. In former years activity has been primarily confined to operation of scattered test plants and the introduction of a multitude of "name" processes with few full scale plants actively engaged in normal operation.

The past year, however, has emphasized a far more general recognition of the adaptability of chemical treatment to variable loads and variable treatment requirements, and has provided an important period for the development of actual operating data, based on plant performance.



At Cleveland—Another "Bubble of Progress." The Sludge-Gas Hortonsphere, a Pressure Type Holder, Takes Form.

Among the larger plants providing chemical treatment are the new works at Minneapolis-St. Paul; Atlanta, Ga.; Denver, Colo.; New Britain, Conn.; West Haven, Conn.; New Brunswick, N. J., San Francisco; and Colorado Springs.

Rapid Filtration

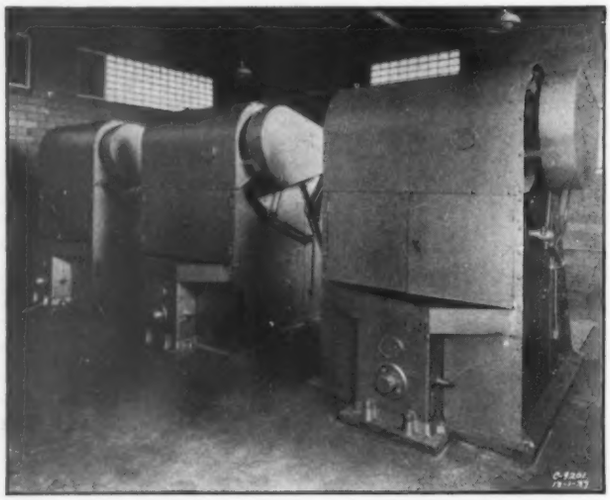
Rapid filtration to increase the degree of treatment provided by plain sedimentation, or to improve clarifier effluents, with or without chemical treatment, constitutes an important phase of 1937 activity. Having been first introduced at Dearborn, Mich., in 1932, a second unit was installed at Perth Amboy in June, 1935. The four installations in 1936 have been supplemented by others during the current year at Elmira, N. Y.; Atlanta, Ga.; and Denver, Colo.; and the Chicago Sanitary District, with units under construction at Greece, N. Y.; Minneapolis-St. Paul; Cleveland's Southerly plant, and Barberton, Ohio. The installation at Greece, N. Y., is the first application to activated sludge effluents.

The original upward flow magnetite filter has been modified in several installations and units at Chicago and Denver are of the downward flow rectangular type. The year's activities have provided valuable performance records at Perth Amboy, N. J.; Goshen, Ind.; Chillicothe, Ohio, as well as at the several plants placed in operation during the early part of this year.

Industrial Wastes

Industrial waste treatment has received more attention during the past year than in many former years, a natural reflection of increased activity in sewage treatment plant installations and anti-pollution legislation, passed or proposed.

With the exception of certain aggravated cases, waste treatment has naturally lagged behind sewage treatment installations. While municipalities without adequate treatment works have continued to grossly pollute adjoining streams, it has inevitably been difficult and, in many cases, unjustifiable to force private industry to make expenditures necessary for effective waste treatment. Division of responsibility retards progress in alleviation of pollution. And uncertainty, as to whether municipal programs would or would not provide for industrial wastes, has frequently afforded an effective excuse for "no progress."



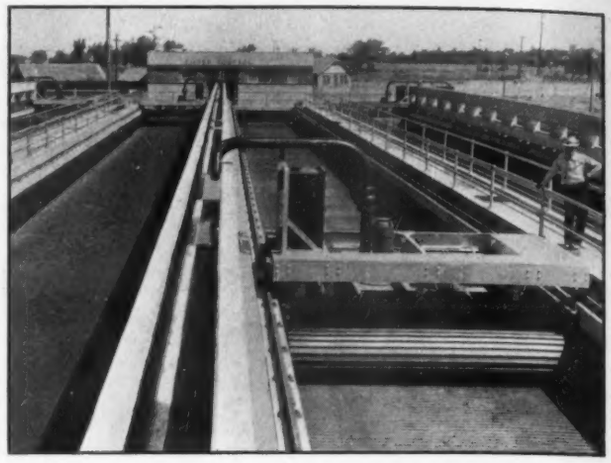
At the New and Modern Denver, Colo., Plant. The Combination Automatically Cleaned Bar Screens and the New Rex Screenings "Triturators." (Black and Veatch, Engrs.)

It is, on the other hand, inconceivable, that the construction of adequate municipal plants will not in many cases be followed by equally important steps to eliminate industrial waste pollution. In many instances, benefits due from substantial sewage treatment expenditures will not be effectively realized until this accompanying phase of pollution is properly remedied.

While industrial waste interference with some treatment methods has long been realized, many developments of the past few years will be found to be effectually applicable to the solution of these problems.

Independent treatment at each industrial plant, involving high cost of installation and operation and presenting numerous practical difficulties, should be adopted for special cases rather than as a general practice.

It is believed that better progress in alleviation of stream pollution can be obtained at far less cost, in the majority of cases, by regulated discharge and treatment of wastes mixed with domestic sewage at municipal plants. Necessarily, such plants must be properly designed for handling the variable composite character of the resulting flow received. In some cases a preparatory pre-treatment of wastes at the municipal plants or at the source may prove necessary.



The New Denver Chemical Treatment Plant. A Close-Up of the Cleaning Mechanism and the Battery of 6 Down-Flow Magnetite Filters—12x200 Ft. Each. (Black and Veatch, Engr.) (Photo Courtesy Filtration Equip. Corp.)

Recent comprehensive studies of treatment of packing house wastes at Cedar Rapids, demonstrated the feasibility of treatment of such wastes mixed with sewage at least up to a ratio of 1:4. Fine screening was found to be an advantageous pretreatment for concentrated wastes, and 30 minute mechanical flocculation was beneficial, prior to sedimentation, in increasing suspended solids and B.O.D. removal.

At Santa Clara, California, a plain sedimentation, separate sludge digestion plant operated effectively with a variety of industrial wastes, the volume of which is reflected by a flow of 0.5 m.g.d. off season, and 1.1 m.g.d. during the canning season. Tributary industries included two canneries, three meat-packing houses, a walnut packing factory, a tannery, and two small creameries. Removals during the canning season were suspended solids 57 per cent and B.O.D. 27 per cent, whereas at other times the removals were 70 per cent and 42 per cent respectively.

High Rate Trickling Filters

One of the very interesting activities of the past year has been the continued investigation of the performance of high rate trickling filters, with and without supplementary aeration, and with variable recirculation ratios.

The extensive experiments of the Chicago Sanitary District have been continued at the West Side Plant, and it is reported that a 20 m.g.d. rate was maintained with milk wastes at Nunda, N. Y. Loadings of 12 cu. ft. of stone, per pound of B.O.D., have been investigated and preliminary reports indicate effective treat-

Austin's (Texas) Modern 12 M.G.D. Plant—Gives Activated Sludge Treatment and Provides Multiple Stage Sludge Digestion. (Hawley, Freese and Nichols, Engrs.)

ment efficiencies, accompanied by reduction of pooling and filter fly nuisance.

The relative economy of construction with design rates of 20 m.g.d. is evident. And, if the feasibility of such rates is adequately established, trickling filters will radically move downward in any schedule of comparative costs of alternate methods of treatment. The problems of space requirements and nuisance prevention, by covering or otherwise, are obviously markedly reduced by loading of this magnitude.

Miscellaneous Activities

Tapered Aeration: Tapered aeration has been investigated in connection with activated sludge plant design and operation, and the new Tallmans Island Plant in New York City features special provisions along these lines, whereby primary effluent in known volume may be admitted in varying amounts at three points along the aeration tanks.

Grease Separation: Experiments with aero-chlorination at Woonsocket, R. I., and Baltimore, Md., as an aid to improved grease separation, demonstrated that the use of 1.5 to 2.5 p.p.m. of chlorine (on the basis of the sewage flow), added as chlorine gas to the air header, introduced into 6 minute retention skimming tanks ahead of the primary settling tanks, resulted in an increased grease removal of from 220 to 430 per cent.

Air Conditioning: A striking increase in air conditioning, reported by a Governmental Bureau revealing an increase of 1,400 per cent since 1933, makes mandatory a consideration of this development and the consequent effects on sewage flow. Exhaustive studies of the Chicago distribution system revealed peak flows on maximum days equivalent to 250 per cent of annual averages in districts subjected to intensive development of this type of equipment. The adoption of evaporative type of cooling devices, at higher installation costs, with a saving in water and operating cost of sufficient amount to justify the higher initial expenditure, may provide an actual curb on increased sewer loadings from this source.

Screens: The development of mechanical bar screens and a consequent greatly increased yield of screenings from bar racks has been attended by increased difficulty of disposal of the highly objectionable screenings. Many recent installations, including provisions for grinding and the modification of some of the earlier grinders for the less severe service involved in screenings grinding, have been reflected in units of lighter construction and lower horsepower, thus making such equipment feasible in smaller plants than has heretofore been the case.

Activated carbon has been the subject of experiments at Rochester, Newark, Fairport, Pottstown, and Norristown, the use being directed to odor control, reduced scum formation on tanks and digesters, and improved sludge digestion and dewatering.

Flow Records: Provision of adequate facilities for flow measurement has received more widespread consideration, and any valid basis for omission of such provisions in any plant worthy of erection is inconceivable.

Infiltration: The trend toward provision of treatment for a substantial proportion of the sewered population of the country, and increased standards and higher degrees of treatment may well direct more attention to the high infiltration rates in many systems, the consequent wide variations in flow, and the resulting higher installation costs and operation difficulties. Municipalities, as yet unsewered and contemplating simultaneous installation of treatment, can profitably consider this important question.

▼

Isaac S. Walker Dies Suddenly

Isaac S. Walker (Snapped at His Last Convention)

Isaac Stanley Walker, well-known hydraulic and sanitary engineer of Philadelphia, died suddenly at his home in Frankford, Pa., on January 23rd, after suffering a heart attack. He was 54 years old, and is survived by his widow, three sons and two daughters.

Mr. Walker at one time taught hydraulics and sanitary engineering at Columbia University. He later became general manager of the Delaware Water Supply Co., and likewise of the water utility companies supplying Chester, Pa., Vincennes, Ind., and Greencastle, Ind. Later he became vice-president and general manager of the important Pennsylvania Water Service Co. and the Scranton Spring-Brook Water Service Co., from which positions he resigned to enter private consulting practice in 1930.

Mr. Walker's most important work as a consulting hydraulic engineer was his commission in 1930 to plan and design the water supply and sewerage systems for Moscow, Russia, where he spent some time. The same year he designed the large 200,000,000 gallon reservoir, located at West Chester, Pa. Recently, he had been serving as an associate consultant to the National Resources Board's Committee on Water Supply—with special assignment to making a study of and a report on the future needs in advancing water supply conservation in the Delaware River Basin, which he completed last year.

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Editor of Water Works and Sewerage Honored by A. S. C. E. and the Sewage Works Federation

At the recent Annual Dinner of the Sanitary Engineering Division of the American Society of Civil Engineers, it was announced that Linn H. Enslow, editor of this magazine, had been elected to serve on its Executive Board.

During the same week the Board of Control of the Federation of Sewage Works Associations of America, at its annual meeting in New York City, elected Mr. Enslow to the Board as "member at large," later electing him Vice-chairman of the Federation. At the annual election of officers the following were re-elected:

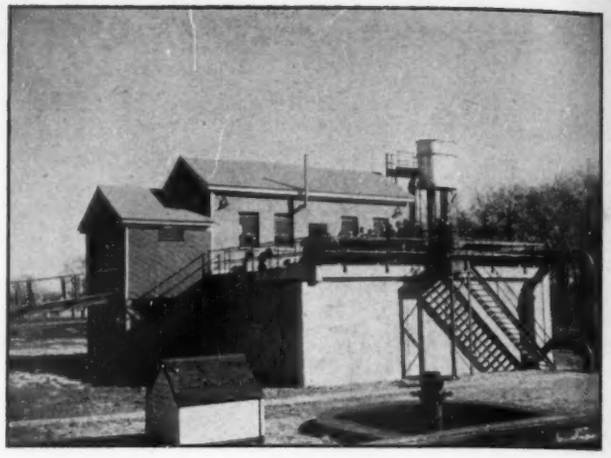
Chairman—C. A. Emerson, Cons. Engr., New York.

Vice-Chairman—L. H. Enslow, Editor, WATER WORKS AND SEWERAGE, New York City.

Secretary—H. E. Moses, Chief Engr., Penna. Dept. of Health, Harrisburg.

Editor—F. W. Mohlman, Chief Chemist, Sanitary District, Chicago.

[For the first time in the history of the Federation the Business Manager was proudly able to report that *Sewage Works Journal* had not only become self-supporting, but actually a slight net profit in 1937 had been shown. Further, advertising space already contracted for during the coming year was showing a slight gain over 1937, this to the gratification of all concerned.—ED.]



Valley Stream Plant of the Long Island Water Corpn. Group Watching the Cleaning Demonstration.

CLEANING FILTERS WITH SULPHUR DIOXIDE

By J. G. PATRICK
Chemist, West Virginia Pulp & Paper Co.
Luke, Maryland

The Author

FREQUENTLY the sand grains of rapid sand filters become coated with mud, biological slime, manganese, organic matter, iron, floc particles, or a combination of two or more of these film-building materials. When sand grains become thus coated the filter suffers loss of efficiency; mud balls and hard-spots appear, wash water requirements go up. The "schmutchdecke" era is of the past, and it has become well established that the "clean filter is the best filter." Several methods have been employed to loosen the coatings from filter-sand grains sufficiently to allow prevailing washing rates to remove them.

The writer found the use of caustic soda and chlorine, so effective in many cases, of little value in loosening coatings made up in good part of manganese and iron oxides. Then, the idea of utilizing an effective reducing material occurred to him. In looking for the reducing agent most simple to apply and least costly, the possibilities of sulphur dioxide gas came to mind. The scheme proved as simple as contemplated, and even more effective than anticipated.

This paper is written to tell of some of the experiences with the sulphurous acid method of sand cleansing in four filter plants. So successful has been the scheme that the writer has, for protective reasons, taken out U. S. Patent 2,069,621, covering "A Method of Cleaning Sand Filter and Appurtenances." This patent has been assigned to West Virginia Pulp and Paper Company and its Industrial Chemical Sales Division.

Part I—Early Experiences at Luke, Md.

The process was developed at the 12 m.g.d. filtration plant of the West Va. Pulp and Paper Co., operated under the writer's supervision.

The raw water is heavily contaminated with acid coal mine wastes contributing the useful but, at the same time, troublesome iron and manganese. Caustic soda, and alum to supplement the iron and aluminum salts in the raw water, are employed as the coagulating chemicals. Activated carbon is added to the raw water to assist in clarification. The iron content of the raw water averages 1.00 p.p.m. and is reduced to 0.17 p.p.m. by treatment. The manganese is less affected, being decreased only from 0.30 to 0.26 p.p.m. because of partial oxidation only.

Early Cleaning Methods

After two years of services, attempts were made to clean the sand beds by treating them with a 2 per cent solution of caustic soda, thereafter stirring the sand by an air-lance. The sand was only partially cleaned. Total cost, including all incidentals, was $37.50 per filter of 154 cubic yards. Other efforts were made to clean the underdrains and filter bed by chlorine applications to the wash water, but this was only partially successful. Mechanical treatment was applied to break up the mud balls.

Sulphur Dioxide Tried

Under the author's direction sulphur dioxide had already proved successful in removing manganese deposits from the water mains in the mill. These mains were found to be heavily coated with the undesired hydrated manganese dioxide, which broke away to produce dark and smudgy specks that spoiled many tons of high grade white paper. A 0.2 per cent solution of SO_2 water (sulphurous acid), allowed to stand in the mains 6 hours, reduced and removed the manganese effectively.

Laboratory tests were first made by treating the filter sand with SO_2 water of various strengths. These tests showed a concentration of 3.0 per cent SO_2 in the water cleaned the sand to its original white sharp grained condition.

Filter Bed Treated

Encouraged by the experimental results, SO_2 treatment was tried on a large scale with a filter bed. Preliminary to introducing the SO_2 the filter was prepared as follows:

(1.) Filter thoroughly washed, to reduce gas consumption by loose material.

The Filter Plant of the W. Va. Pulp and Paper Co., Luke, Md.

(2.) Water drawn down through sand into gravel.

(3.) Main effluent header and wash water valve closed.

(4.) All small pipe connections across the Venturi and other meters closed.

(5.) A cylinder of liquid SO_2 (similar to chlorine cylinders) was then attached to the effluent header by a brass pipe and standard chlorine tank connections and the SO_2 added as a gas. A heat evaporator was necessary to hasten the exit of the gas, and even that required a few hours to empty a tank. (In later applications the cylinder was inverted and 150 pounds of liquid SO_2 could be drawn off in 10 minutes, if desired.)

(6.) As the liquid SO_2 was applied, the wash water valve was opened a little, water permitted to enter and force the sulphurous acid into the underdrains, and up through the gravel and the sand to a one-foot depth above it.

(7.) After standing the required time the filter was given at least three back-washings.

Following the gas treatment the first washings were dark gray, changing to a light yellow. An analysis of the early material proved it was chiefly iron-aluminum floc discolored with some manganese dioxide and activated carbon. The yellowish substance was iron and manganese in solution.

The filters were so improved in efficiency and capacity, other treatments were given as conditions warranted.

Pertinent data giving the strength of solution, cost, and results obtained in treating three different 3 million gallon filter units (154 cubic yards of sand each) are given in Table I.

Since most of the coating has been removed from sand, gravel and pipes the concentration of the solution can now be diminished and the interval between treatments extended to maintain practically clean surfaces.

The quantity of SO_2 used was less than the amount shown by the laboratory tests, only enough to make a weak acid solution which is quickly spent, and likewise harmless to metal surfaces.

A dosage concentration of 0.3 per cent SO_2 appears to be rather effective at Luke, without being corrosive. At this concentration, 150 pounds of SO_2 makes 6,000 gallons of sulphurous acid to fill the voids in the gravel and sand bed.

Mechanical agitation or raking the bed during treatment hastens the action. Naturally the longer the soaking period within limits the cleaner the sand becomes.

Results of Treatment

1. On hard and over-capacity-draughts there was no floc or dirt drawn through the filter bed.
2. Mud balls disintegrated.
3. The wash-water was more uniformly distributed throughout the sand bed.
4. Sand was lighter in color, having lost much of its coating; and, thereby, its buoyancy.
5. Filter runs were extended 25 per cent in time between washings.

Advantages of the Method

1. Liquid SO_2 is easily obtained in convenient portable cylinders at a reasonable cost. Usually the commercial grade can be purchased at 10 to 12 cents per pound.
2. The application is simple with most filters. The cylinder may be connected to brass pipe by means of the standard flexible tubing and the adoptors used with chlorine cylinders. (Rubber tubing, with brass union connections, may be used in place of pipes.) The average cylinder can be emptied as liquid within 10 minutes. (See sketch.)
3. Labor cost is small, requiring only a few man-hours to wash the filter preparatory to, and after treatment, and connect piping—a one-man job.
4. The SO_2 reacts not only with the manganese, but also with the iron, etc. The sulphurous acid kills bacteria and plankton, disintegrates mud balls, opens closed ports in the collector pipes. It reaches into inaccessible parts of the filter.
5. The SO_2 is less dangerous to handle than many other aggressive chemicals, especially sulphuric acid, sodium hydroxide, etc.
6. The removal of the sand, as with the ejector method, is unnecessary.

Preparations for Using SO_2

These tests demonstrated that sulphur dioxide gas must be respected and handled with reasonable caution.

All pipe connections must be kept tight. The gas is irritatingly unpleasant. A gas mask equipped with an "acid" gas cannister is good protection to have at hand in case of an escape of the gas in a poorly ventilated room.

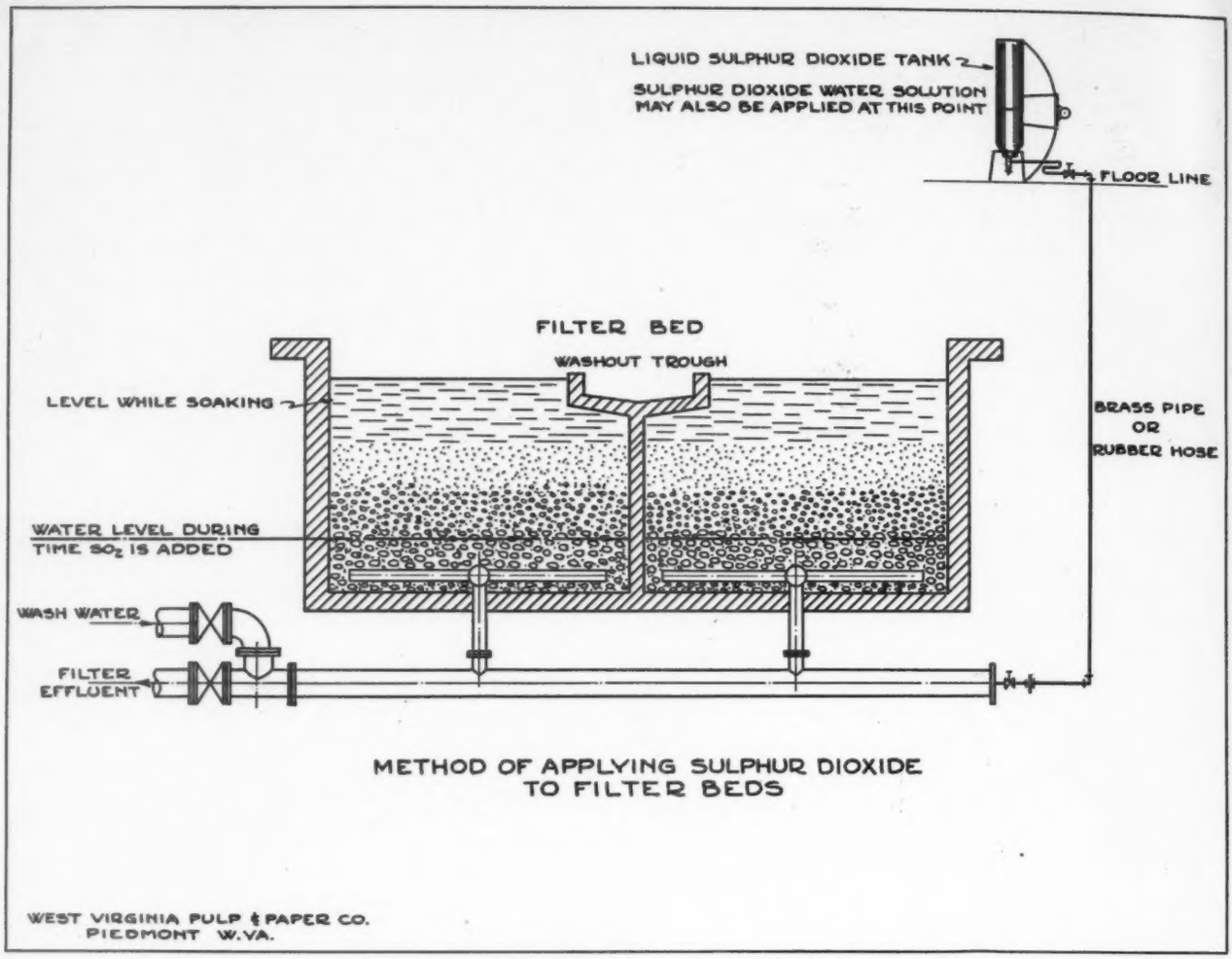
The liquid striking a moist skin may cause a "frozen-burn" from the resulting quick evaporation.

Comments

It is believed the sulphur dioxide solution (sulphurous acid) cleans the pipe interiors, the gravel, and the sand in the following manner. The coating existing mostly of iron hydroxide, hydrated manganese dioxide, silica, calcium and magnesium, alumina and organic matter, is acted upon by the sulphurous acid which reduces the manganese to the soluble manganous salts and the ferric

TABLE I

Application No.	SO_2 Lbs.	SO_2 Pct.	Soaking Period, Hours	Wash Water, Gals.	Cost: Labor	Cost: SO_2	Cost: Wash Water	Cost: Total	Cost: Per Cu. Yd.
(1)	100	0.100	5	200,000	$0.80	$10.00	$1.60	$12.40	$0.08
(2)	75	0.075	4	200,000	0.80	7.50	1.60	9.90	0.06
(3)	150	0.150	8	200,000	1.00	12.00	1.60	14.60	0.10


LIQUID SULPHUR DIOXIDE TANK
SULPHUR DIOXIDE WATER SOLUTION MAY ALSO BE APPLIED AT THIS POINT
FLOOR LINE
FILTER BED
WASHOUT TROUGH
LEVEL WHILE SOAKING
BRASS PIPE OR RUBBER HOSE
WATER LEVEL DURING TIME SO_2 IS ADDED
WASH WATER
FILTER EFFLUENT
METHOD OF APPLYING SULPHUR DIOXIDE TO FILTER BEDS
WEST VIRGINIA PULP & PAPER CO. PIEDMONT W.VA.

Sketch Depicting Method of Applying Sulphur Dioxide to Cleanse Filter Beds.

iron to ferrous iron at least in part. The oxidation continuing, sulphuric acid is formed to some extent. The acid dissolves or loosens the incrustants, breaks apart agglomerations, scours the gravel, and unplugs collector pipe orifices that may be partially closed.

It is generally more economical to apply small doses of SO_2 at frequent intervals, since so little labor is required, thus removing a small portion of the coating each time, than to use a strong dose at longer intervals to get rid of a greater amount of the coating at one treatment. With the weaker solution risk of corrosive attack on metal parts is far less.

It is our belief that the sulphur dioxide method of treating filters is the answer to the problem of loosening sand coatings for easy removal. For removing the calcium carbonate coating from filters in water softening plants, the scheme is not recommended, however. This because of the dangers of cementation of grains, caused by conversion of the calcium carbonate to calcium sulphite and, possibly, some sulphate where oxidizing compounds (iron and manganese) are present.

[Calcium carbonate can most effectively be removed by acid or chlorine water to form soluble chlorides.—ED.]

Part II—A Demonstration at Baltimore, Md.

A demonstration was arranged with Mr. James W. Armstrong, Filtration Engineer, Baltimore, Md., to study the merits of the sulphur-dioxide process.

The raw water at this plant is from the Gunpowder River where several billion gallons are impounded in Loch Raven reservoir. It contains an average of 0.5 p.p.m. iron (Fe); 0.2 p.p.m. aluminum (Al); and 0.27 p.p.m. manganese (Mn); and 38.0 p.p.m. alkalinity. Frequently the manganese content runs so high as to necessitate the use of lime and iron to precipitate it, with the iron, ahead of the filters.

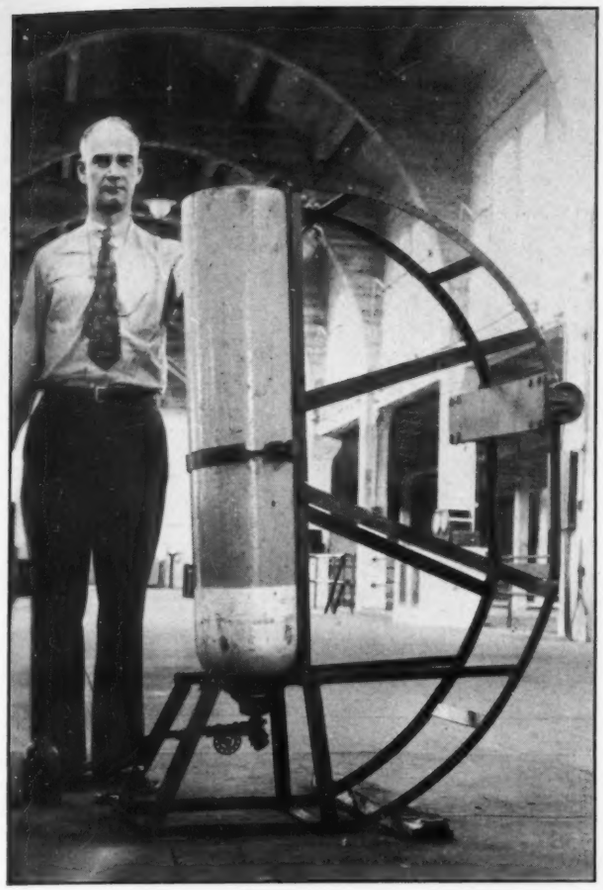
The Filter

The filter, of 4 m.g.d. capacity, has a sand surface of 1440 square feet; there being 18 in. sand depth and 18 in. of graduated gravel with a volume of 160 cubic yards. Voids are calculated at 40% = 1728 cubic feet or 108,000 lbs. of water to fill the void spaces.

Sand is usually cleaned by an ejector-washer about every two years, at approximate cost of $50.00, requiring four men per filter. The gravel is dug out and run through a revolving grading screen, aided by hard jets of water. Much time is required to replace the gravel in the separate layers of the proper size.

Before the SO_2 treatment the sand had a deep brownish-black color and was sticky enough to be moulded wet. Several fair-sized mud balls and ridges were prominent. The gravel, as checked in an untreated filter bed (No. 14), had a pasty black coating about ⅛ inch thick. There was a thin coating of mud on top of the sand bed, and in some sections this mud had penetrated several inches into the sand. The concrete walls and troughs were coated with a dark slime.

The filter was given a thorough back-washing for 4½ minutes (151,000 gallons) preceding the treatment. The water rose unevenly through the sand, indicating some quiet or inactive collector pipe ports or hard spot interference.



The Ingenious Cylinder Inverting Cradle, Operated by H. B. Channon of the Virginia Smelting Co.

SO_2 Application

The SO_2 supplied by the Virginia Smelting Co. was added as liquid. (See sketch.) Using the general procedure already described, the water level was lowered to near the bottom of the gravel (indicated in a gauge glass on outside of filter); the SO_2 was introduced; water then added slowly through the underdrains until the level was above the top of the sand. The soaking in this solution of sulphurous acid continued overnight. The filter was then backwashed a few times, and samples taken of the waste water from the top at the wash troughs and also underneath, from the rewash line. Examinations of the sand and the gravel were made and the effluent and wash water analyzed for iron and manganese after each treatment.

A connection was made with the cast iron effluent header by means of a ⅜ inch brass nipple and valve. The SO_2 cylinder, on the operating floor above, was connected thereto with a flexible ⅜ inch rubber hose. An auxiliary valve, with union connection, was on the hose at the cylinder to aid in disconnecting the container and to prevent the escape of any SO_2 gas.

The quivering motion of the flexible hose, and the coating of frost on the brass valve and pipe at the effluent header, were good signs the liquid was flowing. The disappearance of the frost served as a good indicator that the cylinder was empty of liquid SO_2 and could be disconnected.

(Strong ammonium water serves well in detecting any leaks of SO_2, because vapors of ammonium sulfite (smoke) quickly form.)

Practically the total 1,950 pounds (13 by 150 lbs.) of SO_2 was added without any annoyance of escaping gas. The only perceptible odor was momentarily during the occasional opening of a test valve for SO_2 water. The 1,950 pounds of liquid SO_2 (based on the 108,000 gallons in the 40 per cent voids in the sand) produced a 1.80 per cent solution. After dosing, water was introduced underneath to force the sulphurous acid formed up through and above the sand bed. Thus it stood during the overnight soaking period.

At the end of this time the filter was backwashed. Samples were collected from the wash troughs and from underneath the bed at the rewash or waste pipe, and other observations were made. The water samples were tested for pH, iron, manganese, and unspent (residual) sulfites.

Special Equipment

A convenient piece of apparatus, which facilitated and expedited the handling and the emptying of the SO_2 tanks, was a portable inversion stand supplied by the Virginia Smelting Company. As shown in the accompanying photograph, this device consisted of a simple semi-circular rack made of one-inch angle iron. It was so balanced for rolling in one direction to pick up the full cylinder after clamping in place. A reverse roll inverted the cylinder to the vertical position shown, with the tank valve readily accessible for attaching the rubber hose. Two small wheels, midway of the arc, permitted easy wheeling in transportation, when the container was left in a horizontal position. It is truly a one-man, one-hand rack, allowing cylinders to be attached, moved around, or inverted with little effort. A 150-pound cylinder could be set into position and connected in 1½ minutes; emptied in 10 minutes; disconnected and removed in 1½ minutes—the total of 13 minutes being required for the complete cycle.

APPROXIMATE COST

Sulfur dioxide—1,950 lbs. at $.08	$156.00
Wash water—2,435,000 gals. at $8.00 M.G.	19.26
Labor—preparation—examination of bed	15.00
Total	$190.26
Total cost per cu. yd. of bed (160 yds.)	$1.19

After the third wash the sand and the gravel were examined by digging to the collector pipes. The sand was clean, bright in color, and the last two (larger) layers of gravel still showed good-sized areas of partly loosened or semi-dissolved typical black and pasty coating. With a longer soaking period or a higher velocity of wash water it is believed this coating would have been eliminated by the treatment, for it was easily washed off by one or two dips in quiet water. With the gravel in another filter (No. 14) untreated with SO_2, this pasty coating required considerable agitation or rubbing to remove it from the gravel. Further evidence that this coating was effectively loosened, and partially dissolved, was shown by the fact that the filter had to be drained to waste for several hours before it was sufficiently free of manganese content to warrant turning the water into the clear well.

Results from Treatment

Since we were primarily interested in removing the coating on the sand and gravel, and this coating was composed chiefly of iron and manganese, these objectionables have been used as a criterion of cleaning in the following data. The results are expressed in pounds per ton (2,000 lbs.) of the sand.

	—Pounds Per Ton—	
	Iron	Manganese
Sand—Before SO_2 Treatment—		
Top of bed	30.83	7.45
Bottom (next to gravel)	22.38	12.44
Sand—After SO_2 Treatment—		
Top of bed	.10	2.49
Bottom (next to gravel)	.08	1.99

Assuming that if the samples of wash-water, containing the dissolved materials, were true representative composite samples, and based on the approximate two million gallons of wash water used in clearing the beds, there were removed in the backwash 410 lbs. of iron and 1,892 lbs. of manganese. With such a large unit, however, it was impossible to get truly representative dirty water samples.

The SO_2 treatment was effective in reducing the size of most mud balls and eliminating or disintegrating some entirely. The sand was cleaner and looser throughout, as shown by the surface motion during backwashing.

The dark color of the backwash water after the soaking, the floc it contained, the brightening of the sand, and the softening and the removal of the greater portion of the black and pasty coating on the gravel and the underdrains, are all evidence that the entire filter was materially cleaned. A few clay-like mud balls remained intact.

All observers were unanimous in their opinions that the filter bed was greatly improved at comparatively small cost. Some were enthusiastic enough to believe that, with a badly coated bed, a higher concentration (say 3 per cent SO_2) and a longer soaking period would completely clean the sand and the gravel without corroding the metal piping.

Part III—Cleaning the Batavia N. Y. Filters

At the municipal water filtration plant of Batavia, N. Y., an SO_2 cleaning demonstration was successfully made November 13-15, 1937.

Two filter beds were treated, one with a 2 per cent solution of sulphur dioxide (sulphurous acid) based on the weight of water in the filters; and another, partly cleaned with a one-half dose, or 1 per cent SO_2. Preliminary laboratory tests on small samples had determined that a 2 per cent SO_2 application would restore the sand to its original quartz whiteness. The contrast between the uncleaned and the cleaned sand was striking. The partly cleaned sand gave an intermediate gray-white color.

After demonstrating to Mr. H. M. Cook, Supt. of Water Works and Filtration, how easily the SO_2 could be applied, he treated the rest of the filter units himself with 1 per cent applications.

It is Mr. Cook's plan to apply another dose of 1 per cent next spring or early summer, when the beds will be needing some form of sterilization. The chief concern is that with the advent of warm weather when plankton and algae are abundant, the bacteria grow profusely within the bed and, at times, the effluent shows a higher count (of a spreader nature) on agar plates than that of the applied water. Since SO_2 is so simple to apply the beds can be treated overnight whenever the occasion demands.

Condition of Filter Beds

The sand in these beds is not as dirty as some, although it bore a dark brown coating of sufficient thickness to cause the adhesion of sand grains to each other. There has been no trouble with the coating breaking off and clouding the effluent. The beds were last cleaned in 1930 when Leopold type filter-bottoms were installed. Mud balls were absent due probably to the hard hosing treatment which has been a practice after each backwash for some weeks. The condition of the gravel and the underdrain is not known as it has been some time since they were inspected.

SO_2 Dosage—Recirculation Tried

The usual procedure was employed here in treating the Batavia filters. They were given a good backwash, then drained through the effluent waste, then wash water introduced to bring the water level up into the gravel bed. The depth of this water was determined by a small pipe gage fastened to the effluent header. The liquid SO_2 was added from an inverted cylinder through the rubber hose and brass connections into a tap made between the valves and the filter manifold or underdrain header. After the addition of the SO_2 enough wash water was run in to bring the solution level to a few inches above the top of the sand bed. The SO_2 hose was then disconnected and a one-inch hose was attached to the top and connected to the suction side of a small centrifugal pump delivering 8 gallons per minute. (See photograph.) The discharge from this pump was carried away by ordinary garden hose, the nozzle end of which was kept submerged under the water above the sand. Every 30 minutes this nozzle was moved to a new point on the sand bed to insure a positive action at all sections. This circulation accelerates the activity of the sulphurous acid more than was anticipated and it was a marked improvement over the natural diffusion experienced at Luke, Md., and Baltimore. It is the first time that recirculation was tried and it is believed it would be especially advantageous not only to insure movement of the solution and sulphur dioxide economy, but also in breaking up mud balls and enlivening dead spots.

This recirculation continued for 24 hours, at the end of which time the sand under the 2 per cent solution had entirely lost its coating and had regained its original color. As mentioned above the test with the 1 per cent solution did not remove all incrustants.

Within a few hours the supernatant liquid on top of the sand changed to a deep lemon color and some SO_2 odor came from this, but at the end of the soaking period there was no trace of SO_2. The filter was backwashed several times as follows:

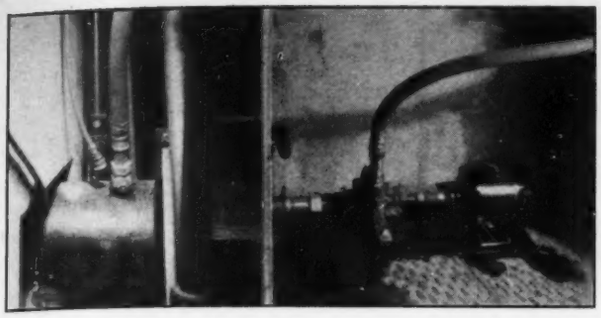
Back Washing	Time	Gals.	Waste Water	pH
1st	9 min.	30,000	Amber	6.0
	(Stood 1 hr.)			
2nd	7½	25,000	Light floc.	6.2
	(Stood 1 hr.)			
3d	7	23,000	Clear	6.3

The first backwash water was a deep amber color covered with several inches of foam. After the above three washings, the filter was put in operation with the effluent run to waste for about 5 hours, and when the pH reached 7.1 was put "on to the line." Measurement of the sand bed before and after treatment showed but little change in depth. That the sand was uniformly cleaned throughout the bed was shown by digging to a depth of two feet in several places. Twenty-four agar plates and fermentation tests on the filter effluent, after cleaning, gave negative results. This is more proof that the sulphurous acid has bactericidal and bleaching action as well as chemical action.

Plant

This filtration plant was erected in 1917 and consists of orthodox coagulation and settling basins, with lime-alum as coagulants plus carbon and prechlorination treatment. The raw water is taken from Tonawanda Creek.

There are six, Pittsburgh type, filter units, 0.5 m.g.d., or total capacity of 3 m.g.d. Average plant discharge is from 250,000 to one and one-half million gallons per day. The filters are 11 ft. by 16 ft. in area, and are composed of 9 inches of graduated gravel from ⅜



Left: SO_2 and Recirculation Hose Connections to Filter Manifold. Right: Small Recirculation Pump, Valley Stream, L. I. Demonstration

in. down, which rest upon Leopold bottoms (perforated corrugations in concrete boxes which straddle the strainers), and 45 inches of 0.7 mm. sand. Instead of the conventional cast iron effluent header these filters have a concrete box-like space, 11 ft. by 16 ft. by 20 in. deep. These dimensions furnish the following data for determining the quantity of SO_2 used:

792 cu. ft. bed × 40 per cent voids × 63 lb. = 19,971 lb. (2,377 gals.) water in filter, plus 10 per cent (box effluent header of 460 sq. ft.) of 19,971 = total 21,968 lb. water. 21,968 × 1 per cent SO_2 = 220 lb. SO_2 per unit for a 1 per cent solution.

Part IV—Cleaning the Filter Beds of the Long Island Water Corporation, Valley Stream, L. I.

This fourth demonstration was made at the request of the Freeport Sulphur Company which has been studying new applications of sulphur compounds through a Fellowship at New York University, New York City, under the supervision of Prof. L. V. Carpenter.

The sand was incrusted with a bright reddish iron oxide. These filter beds were a striking example of an unusual condition, since the water is heavily loaded with iron and manganese and the chief problem has been to remove these compounds.

One of the four 1.5 m.g.d. filters was treated with a 2 per cent solution of sulphur dioxide. This filter bed had recently been opened to examine and replace strainer head, and samples of the gravel and sand were obtained. The gravel bore a typical blackish-brown, pasty coating about 1/16 in. thick of the hydrated manganese dioxide. As the sand was uniformly incrusted with ferric oxide, more on the order of a stain, this red oxide when dry in the sunlight caused the sand grains to resemble garnets. This coating furthermore is an advantage as it has a contact or catalytic action in iron removal. It is claimed that this iron incrustant once eliminated would reduce the efficacy of the sand as an iron remover, and estimated that several weeks would be required to form a new coating. Apparently the coating has become constant since the effective size of the grains has increased only 0.08 mm. with 4½ years' continuous service.

Since the gravel was so heavily coated it is reasonable to think the interior of the effluent header and other lines carry similar coating.

This filtration plant was built in May, 1933.* The filter units are of the Pittsburgh rapid sand type with concrete walls. Daily water consumption, mostly for domestic use, is 1,250,000 gallons. Although the sand in some beds has been shifted by an ejector this is claimed to give little cleaning action. The sand was free and there was evidence of mud balls or effect on filter runs, etc. The filters are washed every 24 hours. It is reported that the interior of the distribution mains to the consumer are being steadily coated with a black deposit which occasionally breaks away and becomes apparent in the water. This further suggests that the manganese is being deposited within the mains. The raw water is from deep wells from 150 to 200 feet deep. A typical analysis of raw and filtered water is as follows:

	ppm.	
	Raw	Filtered
Iron	2.0	0.10
Manganese	0.03	0.00
Hardness ($CaCO_3$)	21.0	25.00
Carbon dioxide	19.0	2.00
Alkalinity, M. O.	14.0	24.00
Color	5.0	0
Turbidity	5.0	0
Dissolved oxygen	...	6 g/1
pH	6.0	7.2

*Mr. H. P. Stearns is manager, Mr. V. Carner is superintendent, of the pumping station and filters, and Mr. C. R. Ibach is the chemist.

Treatment consists of aeration by an Aeromix unit, followed by the addition of 0.6 grains per gallon of lime for oxidation and precipitation of most of the iron during the 15-minute sedimentation preceding filtration. The effluent of the rapid sand filters is stored in open, slow sand filters through which the water is drawn from the bottom and pumped to the distribution mains, hence having double filtration.

Dimensions of the filter beds are: 16 ft. wide, 22 ft. long, with 9 in. of graduated gravel, and 51 in. of sand 0.45 mm. effective size; uniformity coefficient 1.5.

SO_2 Treatment

For cleaning filter No. 3 the quantity of liquid SO_2 required for a 2 per cent solution was calculated as follows:

16 ft. x 22 ft. x 5 ft. bed..... =	352	sq. ft. area = 1,760 cu. ft.
1,760 cu. ft. x 62.5 x 40% voids.... =	44,000	lb. H_2O
To produce 2% solution..... =	880	lb. SO_2
Pipes 1x10 in. + 1x12 in. x 16 + 16 + 11 = 32 cu. ft. ..... =	40	lb. SO_2
3 in. water above sand = 0.25 ft. x = 352 = 88 cu. ft. ..... =	110	lb. SO_2
Total	1,030	lb. SO_2

Actually used 1050 lb. SO_2 @ 9 cents pound = $94.50.
Total solution 6,180 gals.

The regular procedure was used, such as washing the filter thoroughly, and draining it; then adding enough water to take up the SO_2 which was applied in stages, as noted below, to obviate high concentration of sulphurous acid in the header for any long period. The seven cylinders of liquid SO_2, 1050 lb., were added without any leaks or other annoyances.*

"The Filter With Its Throat Cut." Group Watching the Valley Streams, L. I., Demonstration When the SO_2 Treatment Loosened So Much Red Oxide of Iron That the Filter "Ran Blood" for About Half an Hour

Recirculation, as described in the Batavia work, was employed during the 15 hours' soaking period, with a 9-gallons-per-minute pump which actually turned over the solution (theoretically) 1.3 times. The hose nozzle was kept submerged and moved at regular intervals over the surface, at all times. A slight odor of SO_2 arose from the surface of the bed for the first hour and then disappeared. Within five minutes after the water had been raised to above the sand the solution had begun to turn red and at the end of the soaking period the color was a deep crimson or blood red, too dark to see through.

Back Washing

At 11 a. m. the next day (December 4) the filter was backwashed as follows:

Wash	Time	Color of Solution	Wash Water, Gals.
1	10 min.	Blood red Stood 15 minutes	50,000
2	5 min.	Lemon yellow	25,000
Apparently no change in deep red color of sand at 12" below surface. Stood 3 hrs. 10 min. pH 4.2.			
3	5 min.	Light lemon yellow	25,000

At 3:45 p. m. filter put in operation, effluent run to waste. pH 5.7.

At 9:00 p. m. filter put into service. Effluent pH 7.0.

A sample of the gravel was removed several days after the treatment and was found to be clean or free of the black manganese and iron coating.

The sand, however, remained little changed in appearance. Since this iron incrustant is an advantage in the water treatment it is well it retained its coating. Some observers seemed to feel that for a successful SO_2 treatment the sand should have been changed to the white or new condition, as in the case of non-ferrous coatings. The conditions at this plant are unusual, and when these observers understood these conditions and the advantages of the iron contact and saw what was brought from the bowels of the bed they were strongly convinced the SO_2 treatment did fine work, and the demonstration was successful.

Our idea of a successful cleaning is to remove those coatings and loosely bound substances which may be deleterious to operation or the quality of the filter effluent. This was done here in a striking manner.

Results

Sand Examination

Professor Carpenter and his associate, Mr. John Coates, found the following:

Sieve Analysis	Effective Size	Uniformity Coefficient
New sand	0.44	1.50
Before SO_2 treatment	0.52	1.56
After SO_2 treatment	0.485	1.59

The effective size changed by the treatment from 0.52 to 0.485, while the uniformity coefficient remained practically constant.

Further analysis showed the sand incrustants (Fe_2O_3) before cleaning were 6.9 per cent and 5.9 per cent after treatment. Calcium and magnesium were not found in the incrustants, but a small amount of manganese was present.

*In this work the writer was assisted materially by Mr. H. B. Channon of the Virginia Smelting Company, which supplied the liquid sulphur dioxide, and Dr. H. E. Bacon, representing Mr. Sheppard T. Powell, Consulting Chemical Engineer for the Long Island Water Corpn., and the Freeport Sulphur Company.

Analysis of water above sand after recirculation 15 hours* (Piedmont Laboratory):

	Gms/L.	ppm.	Lbs. in Filter Solution
Total solids	30.1	30,100	1,550
Volatile and organic matter	11.0	11,000	564
Silica (acid insol.)	0.9	900	47
Iron	5.9	5,900	310
Manganese	2.4	2,400	124
Calcium	2.1	2,100	108
Magnesium	1.4	1,400	72

*Based on 6,180 gallons in filter, and assuming this was a representative sample.

After the second washing the visitors were guests at a luncheon where Col. J. Wrench of Industrial Chemical Sales Div. of the author's company presided. The writer outlined the history of the SO_2 cleaning method, answered pertinent questions, and introduced other speakers. Those who responded were Mr. H. E. Jordan, Prof. L. V. Carpenter, Dr. H. E. Bacon, and Mr. Linn H. Enslow. Mr. Enslow summarized the impression of the visitors in his remarks, when he said, "I have seen many filters in all kinds of conditions, but this is the first time I ever saw one with its throat cut."

▼

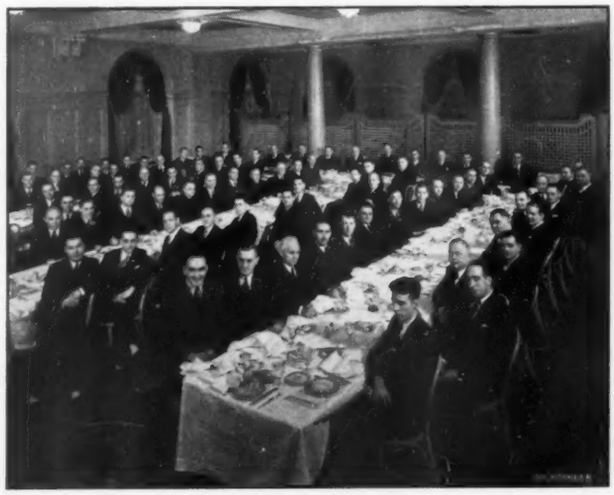
W. L. Stevenson Joins Metcalf & Eddy Engrs.

Announcement has been received from Metcalf & Eddy, of Boston, well-known, pioneering engineering firm in the sanitary and municipal engineering field, that Mr. W. L. Stevenson of Harrisburg, Pa., has become associated with the firm.

Mr. Stevenson for many years, and until his recent resignation, was Chief Engineer of the State Dept. of Health of Pennsylvania. Prior thereto he was engineer in charge of sewerage studies and developments for Philadelphia. Amongst State Sanitary Engineers he was long a popular leader, and built up the most extensive of State Health Department Divisions of Engineering.

Metcalf & Eddy have opened a district office in the Telegraph Building in Harrisburg, to be in charge of Mr. Stevenson.

▼



Pittsburgh Meter and Merco-Nordstrom Officers and Dept. Managers Look Ahead

They Came to Hear W. F. Rockwell, Their President and Host, and Department Heads, Review the Record Progress of Their Companies During the Past Year—And, to Receive from the Colonel a "Rockwellian" Pep-Talk on "What's Ahead for 1938"

GREASE SEPARATION ENHANCED BY AERO-CHLORINATION

Some Results from a Semi-plant Scale Demonstration on Baltimore's Sewage

By C. E. KEEFER[1] and E. C. CROMWELL[2]

Bureau of Sewers,
Baltimore, Md.

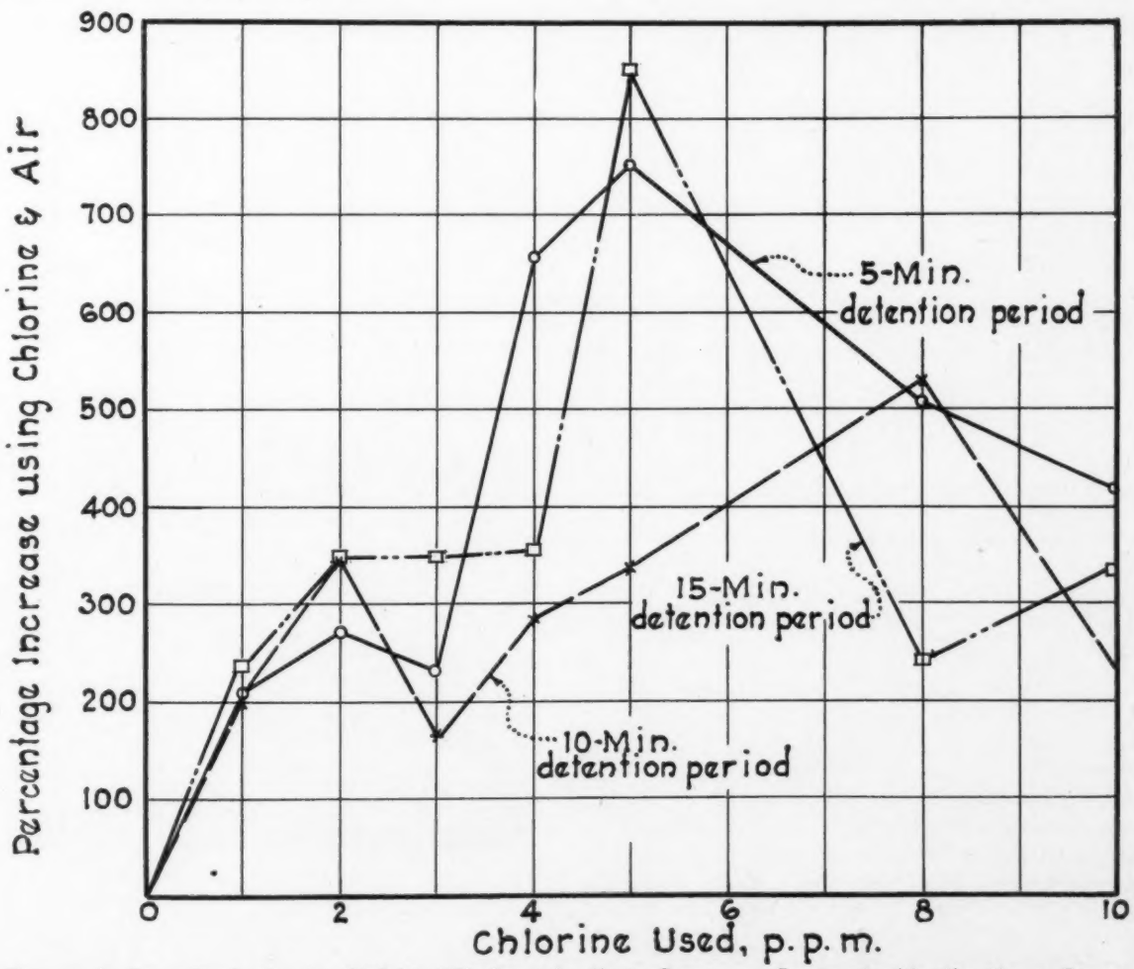
DURING the past ten years sanitary engineers have been devoting considerable attention to the removal of grease from raw sewage. The method, which was developed in the Ruhr District[1] in Germany and which has become more or less standardized, has been to aerate sewage as it flows through a tank providing a detention period of about three minutes. Such short aeration periods have been shown to generally lack adequacy without subsequent detention of the sewage.

An improvement in this method of grease removal was investigated by Faber[2], of the Chlorine Institute, at the Woonsocket, R. I., treatment plant. In the new method gaseous chlorine was injected into the air pipe serving the grease removal tank. The results of this full scale work, which covered a period involving 14 days of careful measurements but of longer duration, indicated that when 1.5 p.p.m. of chlorine were used an increase in grease removal from 189 to 442 per cent, on various days of the week, was obtained as compared with the use of air alone. A similar group of experiments since conducted at Baltimore have given increases ranging from 149 to 847 per cent.

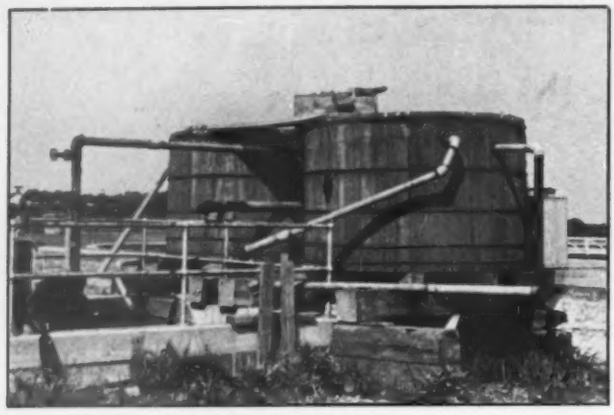
[1]Engineer in charge of Treatment Works.
[2]Chief chemist, Back River Treatment Works.

Method of Conducting Experiments

Raw sewage, which had passed through mechanically-cleaned coarse screens with ¾-in. clear openings, was pumped into two wood-stave tanks here pictured. Each tank is 8 ft. in diameter and 5 ft. deep. As the tanks



Increase in Scum Production by Applying Chlorine and Air to Sewage as Compared with Air Alone. Curves From Air Alone All Lie in the Zero Line, as the A mounts of Scum From Air Alone Were Taken as the Base in Each Test Plotted.



Twin Experimental Tanks Used in Many Tests at the Back River Plant—This Time on the "Aero-Chlorination" Work. Sewage Pump on Left; Overflow and Regulatory Flow-Splitting Box on Top of Tanks; Portable Chlorinator Housing Is Visible Behind the Right Tank; the Air Meters Are Also Behind Tanks.

were too large to give the minimum desired detention periods, a vertical partition was placed at the center of each of them so that the working capacity of each tank was reduced to 800 gal. The sewage entered the tanks at the top through a wooden distribution box, which was adjusted in order to divide the flow equally to the two tanks. At the bottom of each tank there were three "Aloxite" tubes (30 in. long and 1¾ in. diameter) for the distribution of air. The air was measured with two rotary-type gas meters. Chlorine was applied to the air pipe serving one of the tanks; the same ratio, as nearly as practicable, of air without chlorine was applied to the other tank. The diffuser tubes were as nearly alike as manufacture permits and were located similarly in each tank.

Results

Twenty-two preliminary runs, which fall into three groups, were made. (See Table I.) The detention periods of the sewage in the tanks for the three groups of runs were 5, 10 and 15 minutes. Each run, which was started at about 10 a. m. and concluded at 3 p. m., lasted for 5 hours, and was purposely arranged during the time when the sewage was strongest.

Five-minute Aeration Period: When the detention period was 5 minutes, an average of 0.064 cu. ft. of air per gallon of sewage was used. The quantity of chlorine applied was varied from 1 to 10.0 p.p.m.* When the sewage was treated with 1.0 p.p.m. of chlorine, the increase in the quantity of scum was a minimum but amounted to more than twice the yield when air alone was used. Applying 5.0 p.p.m. of chlorine resulted in 7.5 times as much scum being collected. With larger quantities of chlorine, however, the increase became less. It should be pointed out that when more than 3.0 p.p.m. of chlorine were used some of it was not absorbed but escaped into the atmosphere.

Ten-minute Aeration Period: With a 10-minute aeration period, an average of 0.146 cu. ft. of air per gallon of sewage was used. The increase in the yield of scum varied from 1.62 to 5.30 fold, the latter increase occurring with the application of 8.0 p.p.m. of chlorine.

Fifteen-minute Aeration Period: An average of 0.216 cu. ft. of air per gallon of sewage was used when the detention period was 15 minutes. A *minimum* increase of 238 per cent in the volume of scum resulted when using 1.0 p.p.m. of chlorine, and a maximum of 847 per cent when applying 5.0 p.p.m. of chlorine.

*Note—In this work all chlorine dosages in p.p.m., for simplicity sake, refer to the dosage in terms of the volume of sewage, without consideration of the air volume involved.

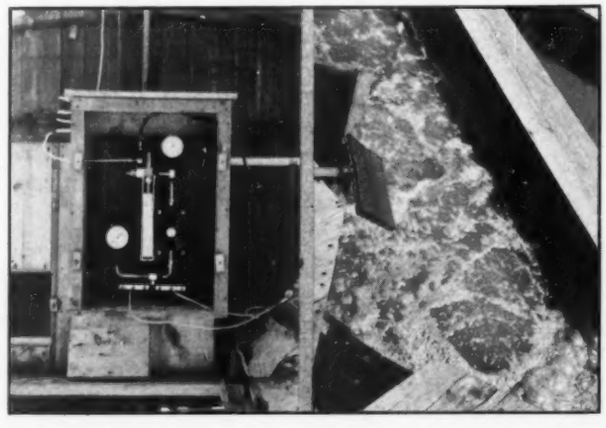
TABLE I—Effect of Chlorine and Air on the Separation of Scum and Grease from Raw Sewage
(Duration of each run: 5 hours.)

Run No.	Day of Test	Air Treatment: Air, Cu. Ft. Per Gal.	Air Treatment: Scum (Dry), Lbs. Per Mil. Gal.	Air Treatment: Grease (Dry Solids, Basis), Pct.	Air and Chlorine Treatment: Chlorine Used p.p.m.*	Air and Chlorine Treatment: Scum (Dry), Lbs. Per Mil. Gal.	Air and Chlorine Treatment: Grease (Dry Solids basis) Pct.	Increase in Scum with Cl_2 Treatment
		Detention Period—5 Minutes						
1	Mon.	.061	1.809	59.2	1.0	3.776	61.5	2.09
2	Thurs.	.070	.844	65.0	2.0	2.278	59.0	2.70
3	Fri.	.063	.788	60.0	3.0	1.792	57.9	2.27
4	Mon.	.066	1.492	52.7	4.0	9.789	51.5	6.56
5	Tues.	.063	1.169	52.7	5.0	8.766	53.8	7.50
6	Tues.	.057	1.667	65.2	8.0	8.375	59.3	5.02
7	Fri.	.069	1.060	64.4	10.0	4.400	57.9	4.15
	Average..	.064						
		Detention Period—10 Minutes						
8	Tues.	.114	1.424	61.1	1.0	2.900	62.1	2.04
9	Fri.	.157	.752	49.3	2.0	2.649	62.4	3.52
10	Mon.	.146	2.986	51.4	3.0	4.851	54.5	1.62
11	Thurs.	.139	1.739	59.9	4.0	4.974	54.7	2.86
12	Fri.	.169	1.869	56.3	5.0	6.339	54.2	3.39
13	Tues.	.144	.591	67.7	8.0	3.130	67.8	5.30
14	Thurs.	.151	1.952	64.2	10.0	4.435	57.1	2.27
	Average..	.146						
		Detention Period—15 minutes						
15	Thus.	.213	1.573	53.7	1.0	3.750	63.1	2.38
16	Wed.	.192	1.277	51.1	2.0	4.442	67.7	3.48
17	Tues.	.201	1.392	52.4	3.0	4.810	55.8	3.46
18	Thurs.	.217	1.795	63.7	4.0	6.375	61.1	3.55
19	Wed.	.232	2.509	59.5	5.0	21.248	51.0	8.47
20	Tues.	.243	2.143	64.4	8.0	5.143	55.5	2.40
21	Thurs.	.211	1.867	64.8	10.0	6.286	57.8	3.37
	Average..	.216						

*The chlorine dosages, for simplicity, were set based on sewage flow treated, and have no relationship to the air-chlorine ratios.

Note—With a diffuser submergence of roughly 4 ft., a slight chlorine odor was noted when adding 3 p.p.m. or more of chlorine mixed with the air.

Twenty-four-hour Aeration Perior: In addition to making the 5-hr. tests four runs were made, each for 24 hr., in order to study the effect of the chlorine and the air throughout the entire day. The amount of chlorine used was 2 p.p.m. during two of the tests and 4 p.p.m. during the other two, with detention periods of 5 and 10 minutes. As indicated in Table II, the use of 2 p.p.m. of chlorine increased the yield of scum 149 per cent with a 5-minute detention period and 213



Portable Chlorinator and Tank Surface. Dry Chlorine Gas Is Fed Into Air Pipe Passing Behind Chlorinator. (Right) Beginning of the Grease Froth Build-up on Surface of Aeration Compartment. Maximum Grease Yields Resulted From Frequent Skimmings, But Even Then Some Grease Escaped Under the Scum Baffle. Yields Recorded Are Known to Be, Accordingly, Less Than Proper Oblong Tank Design, with Side Wall Scum Traps, Would Have Returned

TABLE II—Separation of Scum from Raw Sewage when Using Chlorine and Air for 24-Hour Periods
SCUM—(dry basis)

Period of Treatment	Air Alone lbs./mg.	Air and Chlorine lbs./mg.	Increase in Scum due to Chlorine
Chlorine (2 p.p.m.) Air (0.082 cu.ft. per gal.) Detent'n (5 min.)			
11 A.M.— 2 P.M.	2.576	3.253	1.26
2 P.M.— 5 P.M.	2.613	3.886	1.49
5 P.M.— 8 P.M.	6.798	7.718	1.14
8 P.M.—11 P.M.	4.397	7.569	1.72
11 P.M.— 2 A.M.	3.649	8.189	2.24
2 A.M.— 5 A.M.	2.505	2.170	0.87
5 A.M.— 8 A.M.	1.297	1.212	0.93
8 A.M.—11 A.M.	5.789	13.152	2.27
Average	3.703	5.894	1.49
Chlorine (2 p.p.m.) Air (0.165 cu. ft. per gal.) Detent'n (10 min.)			
12 N.— 3 P.M.	2.401	9.140	3.81
3 P.M.— 6 P.M.	2.318	3.859	1.66
6 P.M.— 9 P.M.	2.874	6.520	2.27
9 P.M.—12 M.	2.764	4.570	1.65
12 M.— 3 A.M.	2.401	3.859	1.61
3 A.M.— 6 A.M.	1.029	2.288	2.22
6 A.M.— 9 A.M.	1.605	1.801	1.12
9 A.M.—12 N.	0.755	2.018	2.67
Average	2.019	4.257	2.13
Chlorine (3 p.p.m.) Air (0.080 cu. ft. per gal.) Detent'n (5 min.)			
11 A.M.— 2 P.M.	1.815	9.331	5.14
2 P.M.— 5 P.M.	4.629	18.553	4.01
5 P.M.— 8 P.M.	11.330	27.296	2.41
8 P.M.—11 P.M.	2.138	10.708	5.01
11 P.M.— 2 A.M.	3.360	10.473	3.21
2 A.M.— 5 A.M.	2.455	7.291	2.97
5 A.M.— 8 A.M.	1.531	2.220	1.45
8 A.M.—11 A.M.	4.827	9.382	1.94
Average	3.998	11.907	3.27
Chlorine (3 p.p.m.) Air (0.165 cu. ft. per gal.) Detent'n (10 min.)			
10 A.M.— 1 P.M.	2.606	3.067	1.18
1 P.M.— 4 P.M.	2.901	12.376	4.27
4 P.M.— 7 P.M.	6.715	18.707	2.79
7 P.M.—10 P.M.	6.351	14.232	2.24
10 P.M.— 1 A.M.	3.086	6.425	2.08
1 A.M.— 4 A.M.	4.081	4.746	1.16
4 A.M.— 7 A.M.*	1,262	3.081	2.44
Averages, 24 hr. Runs...	3.857	8.948	2.31

*Run stopped because of freezing weather.

per cent with a 10-minute detention period or an average of 181 per cent. When 3 p.p.m. of chlorine were used, the increase in the yield was 327 per cent for a 5-minute detention period and 231 per cent for a 10-minute detention with an average of 279 per cent.

Discussion

The accompanying graph, which is based on the data given in Table I, shows the variation in the production of scum when using 5-, 10- and 15-minute detention periods with different dosages of chlorine. Generally speaking, the maximum amount of scum was produced with the use of a 5-minute aeration period and 5 p.p.m. of chlorine. However, even with the application of 1 p.p.m., and only 5 minutes of aeration, the yield was doubled. Interestingly, with chlorine applied, a detention period providing 5 minutes of aeration was as good as, if not actually better than, one of 10 or 15 minutes.

If the results of the experiments at Woonsocket, R. I., on a sewage containing wool scouring wastes, and at Baltimore, on an entirely domestic sewage, are confirmed elsewhere, it would appear that another worthy application for chlorine has been found. At plants where grease is separated from sewage by aeration, a larger amount of additional material can be removed by the injection of chlorine into the air supply. The feature of particular interest is that such a small amount of chlorine gives so considerable an increase in the yield. At existing sewage plantts, where prechlorination and aerated grease removal tanks are provided, the chlorine should preferably be applied in these tanks in order to accomplish a three-fold purpose—rapid distribution, economy, enhanced grease removal. A further investigation of this problem may indicate that when chlorine is used even less air may be required to accomplish the same results. And, in addition to increased efficiency, the combined cost of chlorine and air may be actually less than when using a larger volume of air.

The Baltimore sewage works is under the general supervision of B. L. Crozier, chief engineer, Department of Public Works, and G. E. Finck, sewerage engineer, with G. K. Armeling, superintendent. Harry Weiner, junior chemist, assisted in conducting the experiments. Acknowledgments are due the Wallace and Tiernan Co., who furnished the chlorinator, and the Carborundum Co., who supplied the diffuser tubes. Appreciated cooperation and helpful suggestions were had from L. H. Enslow and H. A. Faber of the Chlorine Institute.

REFERENCES

1. G. Mahr, Technischen Gemeindeblatt, April 5, 1930.
2. H. A. Faber, Water Works and Sewerage, 84, 171 (1937).

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Charlie Bliven Passes On

Long Head of Norfolk's Water System

Chas. H. Bliven (Snapped Not Long Before His Passing)

Charles Hope Bliven, Superintendent of the Water Works of Norfolk, Va., died in his home on January 13th, as the result of a heart attack. He was 58 years "young."

Mr. Bliven became superintendent of the Norfolk system in 1918 when the city purchased the Norfolk County Water Co. His career as a water works man began in 1896 when he went to work for his father, who built and managed the Berkeley, Va., water works. He started in as fireman, later became engineer and then went into the office and, eventually, took the superintendent's position. In 1900 he supervised construction of the Norfolk County Water Co.'s system and was thereafter put in charge as superintendent. The City of Norfolk purchased the County system and in the deal secured a splendid manager. So quickly was this recognized that Charlie Bliven was soon made superintendent of the city system as well. From that day on he has never suffered from political interference—had no fears of such with the record and ability that was his.

Mr. Bliven, long an active member of the American Water Works Association, was stricken in Richmond, Va., on November 5th, a short time after he delivered a discussion before the Virginia Section of the Association. He was a native son of Norfolk, of which he was a No. 1 citizen with hordes of friends and a staff which functioned as "one happy family." In Masonry he was a Knight Templar and a member of Norfolk's colorful Shrine. He leaves a widow, three daughters, a son and two grandchildren.

Acting in Mr. Bliven's position is his best friend and No. 1 staff member—"Ned" Herbert—Engineer in Charge of Pumping Stations, and now, Acting Superintendent.

NEW ORLEANS IN SPRING! WITH A. W. W. A. IN ACTION

(*The Technical Program Just Released Tells the Rest of the Story*)

THE story of the routing of the "A.W.W.A. Specials" to the New Orleans Convention, April 25th-28th is ready for release but will be held for our March issue. Also, what's to be the chief attraction to visitors to historic, romatic, exotic "New Orleans in Spring" is to be told in an issue nearer to the time when the sap moves.

At this writing space prevents saying more than this, "All roads and rails lead to Birmingham, Ala." where the little "specials" will meet on April 23rd at the gateway to the South to become the "Big A.W.W.A. Special," which will roll into New Orleans. Sunday the 24th will be spent seeing our Gulf Coasts—"American Riviera"—from Biloxi to Pass Christian, Mississippi. And then on the Nouvelle Orleans, the home of the Mardi-Gras.

Saturday will see some business before pleasure, at busy Birmingham. In the forenoon: inspection trips to pipe foundries, to see Cast-Iron pipe made by modern centrifugal methods. In the afternoon: to inspect America's largest industrial water supply project—municipally built and owned, and to be operated by the Industrial Water Supply Commission of Birmingham, strictly for benefit of industry.

The Technical Program

The technical program has been completed this year well ahead of customary schedule for release in preliminary form at least.

To pick the high-lights is to read through the program. —Space precludes emphasis when there is so much to emphasize. We would point out, though, that as a headliner the Honorable Harvey C. Couch, of Arkansas (former Chairman of the R.F.C.) comes before A.W.W.A., to say a word on "Present Day Considerations in Water Utility Financing."

Then there follows a Symposium on "The Sewer Rental Method of Financing Sewerage"; followed by Collection Experiences of Water Department Heads," and another on "Meeting Air Conditioning Demands on Water Systems." Then, Round Tables on "Special Summer Sprinkling Rates," "Industrial Rates to Off-Peak Takers," "Meter Specifications—What About Them?," "Corrosion Control," "Selecting Water Service Pipe" (What do we really know about either?)—"The New Classification of Accounts for Water Utilities," the "New Accounting Manual," and "Aboriginal Costs in Evaluating" are just a few at a rapid glance.

The Program

(Subject to correction—Not Final)

MONDAY MORNING, APRIL 25
Business Session

What's Ahead for A. W. W. A.—Eugene F. Dugger, president.

Water Works Practice Committee reports.

The Value of the Accounting Manual—Hal F. Smith, chairman of the A. W. W. A. Committee; Carl F. Chatters, executive secretary, Municipal Finance Officers Association.

MONDAY AFTERNOON, APRIL 25
Plant Management and Operation Division

Highlights of the Water Supply System of New Orleans—Alfred Theard, superintendent, New Orleans Water & Sewerage Board.

Discussion—Geo. C. Earl, consulting engineer.

Workings of the Merit System of Dallas,Texas—as it Applies to Water Works Employees—John B. Winder, superintendent, Dallas Water Department.

A Program of Public Safety in Water Works Operation—Some Practical Aspects and Resultant Benefits—Thos. W. Coleman, engineer, Chattanooga Water Co.

Questions and statements of experience from the floor.

Superintendents' Round Table

What About Meter Specifications—Today and Tomorrow?—Clem A. Gallagher, superintendent of meters, Louisville, Ky.; F. W. Weiss, superintendent of water, Corpus Christi, Texas; G. L. Fugate, superintendent of water, Houston, Texas; Wm. M. Rapp, superintendent of distribution, Atlanta, Ga.; Ed. O. Sweet, superintendent, Birmingham Water Co.

Can Purchased Electric Power or Diesel Power Be Made as Reliable as Steam Power for Pumping Stations?—

(a) Electric Power—W. V. Weir, superintendent, St. Louis Co. Water Co.
(b) Diesel Power—This topic not yet assigned.
(c) Steam Power—This topic not yet assigned.
(d) General Considerations—W. W. Hurlbut, engineer, Distribution, Los Angeles.

TUESDAY FORENOON, APRIL 26
General Session

The Little Rock Pipe Line—With Particular Reference to Manufacture and Laying of the Concrete Pipes (a moving picture)—Col. F. F. Longley, Lock Joint Pipe Co.

Some Present-Day Considerations in Water Utility Financing—Hon. Harvey C. Couch,* president, Arkansas Power & Light Co., Pine Bluff, Ark.

Discussion—W. W. Hurlbut, Los Angeles; Malcolm Pirnie, New York.

Research—An Essential Tool—L. W. Wallace, director of research, Crane Co., Chicago, Ill.

Water Supply and Air Conditioning—

(a) Additional Data Collected by the U. S. Dept. of Commerce, 1937-38—O. C. Holleran, engineer, Dept. of Commerce, Washington, D. C.
(b) Results from Extended Studies in Chicago—Loran D. Gayton, city engineer, Chicago, Ill.
(c) Methods of Meeting Demands Created by Air Conditioning—L. S. Vance, superintendent of water, Louisville, Ky.; W. V. Weir, manager, St. Louis Co. Water Co.; P. L. Brockway, city engineer, Wichita, Kan.; D. L. Erickson, city engineer, Lincoln, Neb.; T. L. Amiss, superintendent of water, Shreveport, La.

(Open discussion.)

TUESDAY AFTERNOON, APRIL 26
General Session

The Ground Waters of the Lower Mississippi Basin—V. T. Stringfield, associate geologist, U. S. Geol. Survey.

Ground Water Production Codes—This topic is not yet definitely assigned.

Problems of One of America's Largest Well Water Developments—That of Houston, Texas—L. R. Howson, consulting engineer, Chicago, Ill.

Emerging Problems in Water Resources, Conservation and Development—Abel Wolman, chairman, National Water Resources Committee.

A New Development in Deep Well Pumping—Henry Folz, engineer, Byron-Jackson Co., 420 Lexington Ave., New York City.

The Maintenance of Dams—Jas. E. Phillips, engineer, Los Angeles.

*Former Chairman of the Reconstruction Finance Corp.

WEDNESDAY FORENOON, APRIL 27
Joint Session

Plant Management and Accounting Divisions

Charges for Private Fire Protection (A Report of the Committee on Private Fire Protection)—John H. Murdoch, Jr., chairman of the committee, American Water Works & Elec. Co.

Discussion—Reeves Newson,† consulting engineer, New York City.

The Sewer Rental Method of Sewerage Financing and Water Department Collection Experiences—R. A. Allton, consulting engineer, Div. of Sewage Treatment, Columbus, Ohio.

Discussion—W. W. Moorehouse, superintendent of water, Dayton, Ohio; J. Darby Bowman, Washington Sub. San. Dist., Hyattsville, Md.; H. E. Blomquist, superintendent, Cedar Rapids, Iowa; L. A. Quigley, superintendent, Fort Worth, Texas.

Round Table

Special Summer Sprinkling Rates and Off-Peak Rates for Other Purposes—Leader—R. E. McDonnell, Burns & McDonnell, Cons. Engrs., Kansas City; Geo. Rohan, superintendent, Waco, Texas; J. P. Newcomb, secretary of Water Board, San Antonio, Texas; R. B. Simms, superintendent, Spartanburg, S. C.; W. R. LaDue, superintendent, Akron, Ohio; John B. Winder, superintendent, Dallas, Texas; F. R. Mills, director of utilities, Daytona Beach, Fla.; Geo. F. Hughes, commissioner, Denver, Col.

WEDNESDAY AFTERNOON, APRIL 27
No Technical Sessions

[Plantation trip down the river.]

THURSDAY FORENOON, APRIL 28
General Session

Liquid Chlorine—A Critical Review of Chlorine Specifications and Accidents—L. L. Hedgepeth, manager, technical service, and W. S. Riggs, manager, research, Pennsylvania Salt Manufacturing Co. (Introductory to the above paper, a movie depicting the manufacture, and pointers on safe handling of liquid chlorine will be shown.)

Pipe Line Coefficients—Report of the Committee on Coefficients—C. L. Bogert, chairman, consulting engineer, New York City.

Discussion—L. R. Howson, consulting engineer, Chicago.

Round Table

Corrosion Control—Studies and Operating Experiences—

(a) Thos. H. Wiggin, engineer, and George D. Norcom, chemist, Federal Water Service Co., New York. (Presenting a progress report on studies as to degrees of the effectiveness of water conditioning, in respect to tuberculation rates.)
(b) Chas. P. Hoover, consulting chemical engineer, Columbus, Ohio. (Developments in the Columbus Study and observations elsewhere.)
(c) S. T. Powell, consulting chemical engineer, Baltimore, Md. (Experiences with oxygen reduction by deaeration as applied to long supply mains.)
(d) I. M. Glace, consulting engineer, Harrisburg, Pa. (Experiences with limestone contact units.)
(e) D. E. Davis, consulting engineer, Pittsburgh, Pa. (Experiences with Zeolite-softened waters and methods of correcting their corrosivity.)
(f) J. Walter Ackerman, chief engineer, Utica (N. Y.) Water Co. (Accomplishments with "Chloramination" as demonstrated with time.)
(g) Carl Alexander, superintendent of filtration, Rome, Ga. (Efficiency of silicates intermittently applied with lime.)

Free discussion and questions from the floor are desired in this round table.

Selection of Water Service Pipe—With Especial Considerations of Operating Conditions and Water Quality—Leader—S. F. Newkirk, Jr., superintendent of water, Elizabeth, N. J.

Discussion—Robert Spurr Weston, consulting engineer, Boston, Mass.; W. S. Mahlie, superintendent filtration, Fort Worth, Texas; Paul Weir, superintendent filtration, Atlanta, Ga.

THURSDAY AFTERNOON, APRIL 28
General Session

Plant Management and Operation Division

Water Supply Systems of Mexico—

(a) The Water Supply System of Mexico City—Eduardo Molina, director, de Auguas y Saneamiento, Mexico, D. F.
(b) The Water Supply System of Vera Cruz—Domingo Guevara Alarcon, chief, Ing., Junta Federal de Mejoras, Materiales de Vera Cruz, Vera Cruz.

Evaluating Cement Lined Mains of Long Service Record—Malcolm Pirnie, consulting engineer, New York City.

Discussion—W. Bruce Harkness, engineer, Tate Lining Process, New York City.

†Nominee for President A. W. W. A.

Design Factors of Cast Iron Pipe—This topic has not yet been definitely assigned.

Corrosion Prevention by Cathodic Protection. (Principles Involved and Practical Application)—Starr Thayer, consulting electrolysis engineer, Houston, Texas.

Discussion—Rubert Kuhn, consulting engineer, New Orleans, La.

Electrolysis Troubles—Leaders—D. D. Gross, superintendent of water, Denver, Col.; J. B. Dean, engineer, St. Louis. (Free discussion and questions from the floor are especially invited.)

Sessions of the Finance and Accounting Division
(See also Joint Session, Wednesday, a. m.)

TUESDAY FORENOON, APRIL 26

Presentation of Manual—Review for Approval of the Division—Hal F. Smith, chairman of the committee.

Report of Classification of Accounts Committee—Louis A. Blum, chairman of the committee.

The New Classification of Accounts for Water Utilities—E. W. Morehouse, chairman, Committee on Statistics and Accounts, National Assn. of Railroad and Utility Commissioners. (Free discussion from the floor invited.)

"Aboriginal" Cost and Its Determination—C. H. Lamb, manager, Jamaica Water Supply Co.

Preparation and Uses of a List of Retirement Units—William Schwartz, Hackensack Water Co.

THURSDAY FORENOON, APRIL 28

Metering as an Aid to Water Works Administration—M. F. Hoffman, commercial superintendent, Dept. Public Works, Cincinnati, Ohio.

Up-to-Date Methods of Meter Testing—John L. Ford, Wabash, Ind.

Business Procedure in the Water Sales Division—Thad Erwin, water business agent, Dept. Water and Power, Los Angeles, Calif.

Discussion—Henry E. Nunn, superintendent of water, Van Buren, Ark.

Safeguarding Water Revenue—M. L. Meites, superintendent of water, Chicago, Ill.

Question Box and Round Table—Followed by annual luncheon of the Division.

Sessions of the Purification Division
(See also Joint Session, Thursday, a. m.)

MONDAY AFTERNOON, APRIL 25

Committee Reports.**

Specifications and Tests for Powdered Carbons—Prof. M. M. Braidech, chairman, Cleveland, Ohio.

Discussion—L. C. Billings, Dallas, Texas; W. A. Helbig, New York, N. Y.

Testing Zeolites—Chas. P. Hoover, chairman, chemical engineer, Water Dept., Columbus, Ohio.

Chloramination—F. W. Gilcreas, chairman, New York State Dept. of Health, Albany, N. Y.

Discussion—H. A. Faber, Chlorine Institute, New York City.

Determination of Fluorides—Dr. A. P. Black, chairman, University of Florida, Gainesville, Fla.

Coordination of Methods of Water Treatment and Laboratory Control. (With especial reference to outbreaks of gastroenteritis)—Geo. D. Norcom, chairman, Federal Water Service Co., New York City.

TUESDAY AFTERNOON, APRIL 26

Waterborne Diseases in the United States and Canada, 1920-37—A. E. Gorman, Chicago, Ill., and Abel Wolman, Baltimore, Md.

Features of the New Water Softening Plant for Minneapolis, Minn.—J. A. Jensen, general superintendent, Water Department, Minneapolis, Minn.

Discussion—Malcolm Pirnie, New York City; Chas. Spaulding, Springfield, Ill.

Developments in Zeo Karb Softening—S. B. Applebaum, vice-president, The Permutit Co., New York.

Fundamentals in the Training of Sanitary Engineers for the Water Works and Sewerage Fields—H. E. Babbit, professor sanitary engineering, Univ. of Illinois, Urbana, Ill.

WEDNESDAY FORENOON, APRIL 27

Operation of the Chickasaw, Ala., Plant—With Especial Reference to the Problem of Color Removal and Corrosion Control—J. E. Jagger, chief engineer, Alabama Water Service Co., Birmingham, Ala., and A. C. Decker, sanitary engineer, Tenn. Coal, Iron and Ry. Co., Birmingham, Ala.

Adsorptive Clays in Water Treatment—Paul Weir, superintendent of Filtration, Atlanta, Ga.

Experiences With Activated Carbon Application to Enhance Efficiency and Economy at Louisville—Wm. Lovejoy, superintendent of filtration, Louisville, Ky.

**Discussion and questions from the floor will follow each report.

Discussion—A. R. Todd, chemist, Water Dept., Wheeling, W. Va.

A Unique Iron Removal Plant—Peter Levy, superintendent, Jamaica (L. I.) Water Co.

Discussion—Dr. F. E. Hale, director of Laboratories, Water Dept., New York City.

Joint Committee on Boiler Feedwater Studies

TUESDAY FORENOON, APRIL 26

Intercrystalline Cracking—The Explanation of Its Occurrence and Prevention—W. C. Schroeder, A. A. Berk and C. H. Fellows.

Water Supply and Treatment Problems of the Freeport Sulfur Company—Homer S. Burns, chief engineer, and H. A. Smith, assistant superintendent, Freeport Sulfur Co., New Orleans.

Silica Removal with Ferric Sulfate—Hydrous Ferris Oxide—Dr. M. C. Schwartz, Louisiana Steam Generating Corp., Baton Rouge, La.

Post Convention Trip

An all day post-convention trip to inspect the unique water supply system and treatment works of the Freeport Sulfur Co. in the Mississippi Delta Country, is being arranged for Friday, April 29th.

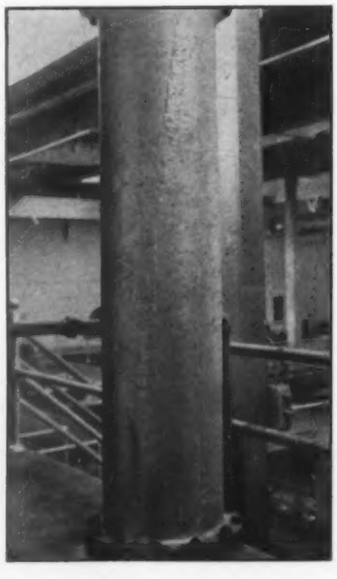
▼

Repairing Cracked Hydraulic Valve Cylinders

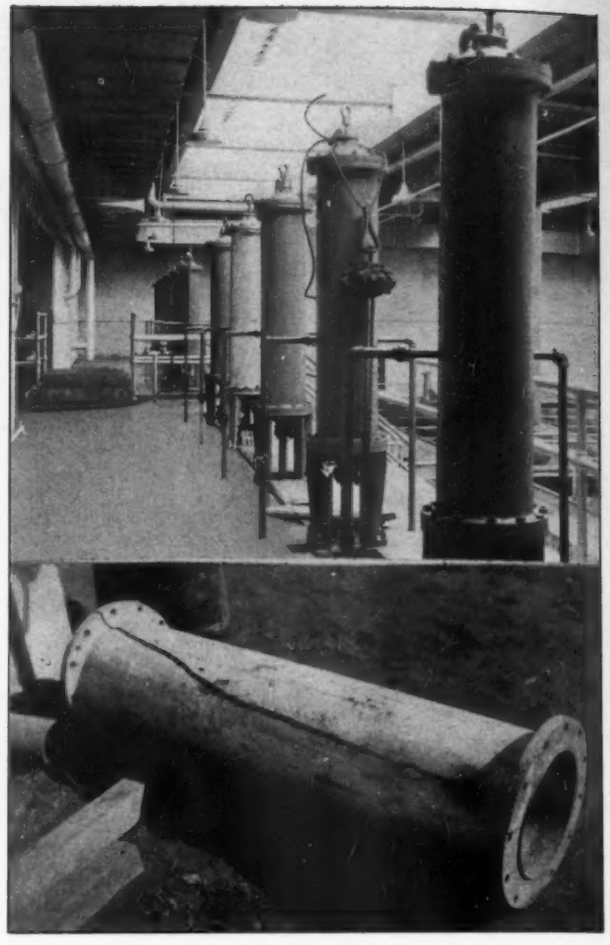
At a sewage disposal plant six hydraulic valve-cylinders and two pump heads were completely split or otherwise seriously damaged due to freezing. The identity of this plant is not important for the purpose of this story, which is being related to indicate the effectiveness of the method of repair, successfully used to avoid a large expense for replacements, had such proved necessary as at first appeared probable.

The damage was caused by an unexpectedly severe cold snap during a testing period on the new equipment; in fact, before the plant was actually completed. Eight of the cast-iron valve cylinders were cracked, one being split from flange to flange—see cut. Each cylinder is approximately 13 inches in diameter and 8 ft. in length, and is lined with a 3/32 inch thick bronze liner tube.

The damaged cylinders were taken down and bronze-welded by using the oxy-acetylene welding method, under the direction of an experienced welder. The accompanying pictures show the battery of repaired valve cylinders, with "before and after" shots of the most seriously damaged cylinder, this one requiring replacement of the bronze liner tube.



A Close Up of the Completely Split Cylinder After Repair. Note the Neatness of the Bronze Weld Along the Crack Line.



Above: The Battery of Hydraulic Valves—After Repairing. Below: The Completely Split Cylinder (Seen in Another Picture After the Repairs).

The cost of welding, including labor and materials, was $584 which represented a net saving of more than $700 when compared with replacement costs.

▼

New A.W.W.A. Headquarters More Spacious

With increasing association activities, expansions and membership growth, A.W.W.A. has been suffering "growing-pains" at headquarters. It has become necessary to seek more spacious offices for the regular and seasonally augmented headquarters staff at times when additional, temporary help is required to handle association matters expeditiously.

Harry E. Jordan, secretary and, we might add, business manager of A.W.W.A. has selected new and larger quarters for the main office in a central location—but a few minutes' walk from New York's Grand Central Station, and the numerous hotels in the contiguous district.

The move from the cramped quarters in the old Engineering Societies Building into a modern and light building at the corner of Madison Ave. and 40th St., will be made March 1st. Thereafter, the new address will be 22 East 40th St.

Announcing

A NEW METHOD of CLEANING FILTER SAND USE SULPHUR DIOXIDE (SO_2)

(U. S. Patent—2,067,621)

Proven advantages of the treatment are:

1. **Sand and gravel are cleaned in place — no mess or trouble usually involved in manual cleaning.**
2. **The underdrains, pipes, and laterals are also cleaned.**
3. **Low man-power necessary — 1 man can clean a filter in his spare time.**
4. **Filter is out of service only 24 hours.**
5. **Better conditioned filters, insuring maximum capacity and efficiency in operation.**
6. **Puts money in your pocket through decreased wash water consumption.**

Sulphur dioxide is easily obtained in convenient form, the application is simple, and results are sure. Why not try it?

ADDITIONAL INFORMATION ON REQUEST.

INDUSTRIAL CHEMICAL SALES

DIVISION WEST VIRGINIA PULP & PAPER CO.

230 Park Ave. New York City — 1002 Lincoln Ave. Tyrone, Pa. — 417 Schofield Bldg., Cleveland, Ohio — 205 W. Wacker Dr. Chicago, Ill.

Manufacturers of NUCHAR Activated Carbon

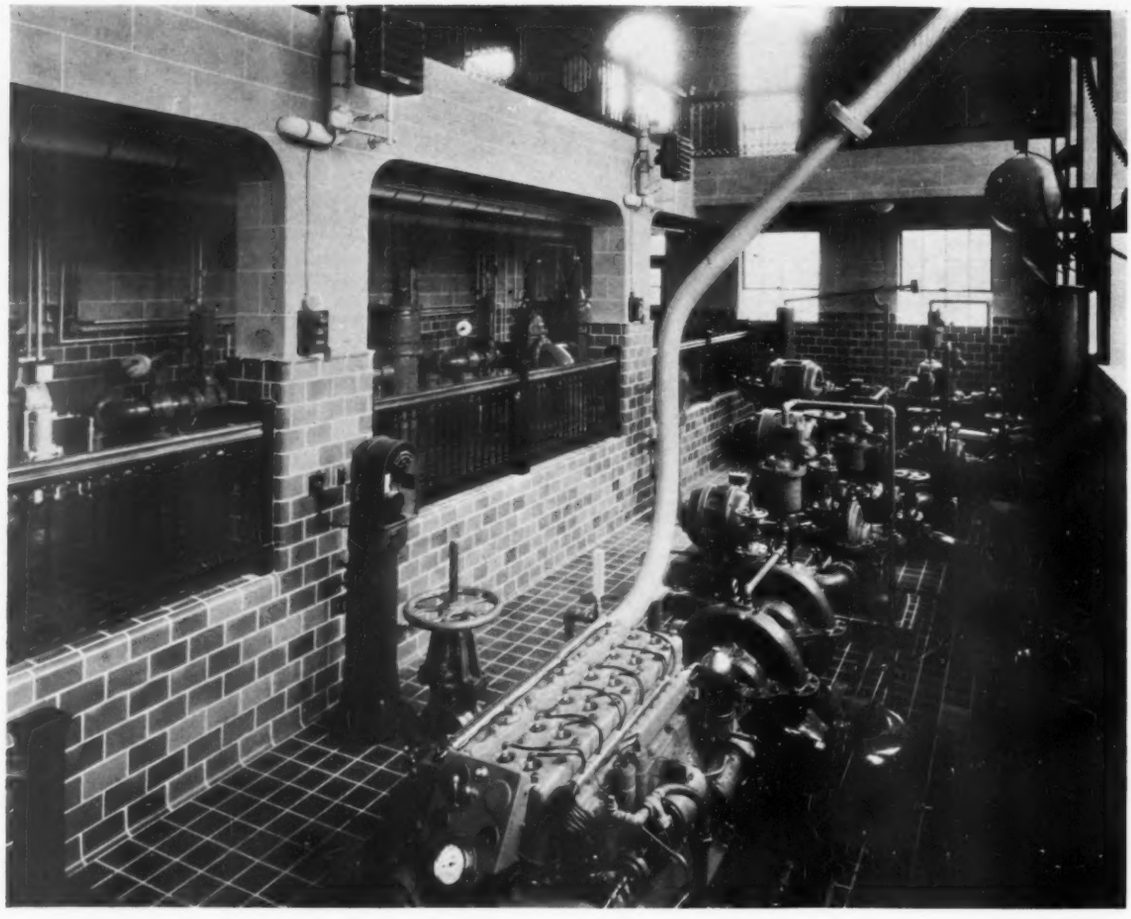
Keeping abreast of
CAST IRON PIPE
THE CAST IRON PIPE RESEARCH ASSOCIATION, THOMAS F. WOLFE, RESEARCH ENGINEER, 1015 PEOPLES GAS BUILDING, CHICAGO, ILLINO

Installing a cast iron water main that will serve for centuries. The world's first cast iron water main and America's first, installed 274 and 116 years ago, respectively, are both in service.

CAST iron pipe, a product older than most American cities, keeps pace with Progress toward the City of the Future. No period in the long history of cast iron pipe manufacture has been so fruitful of product improvement as the past 20 years. This applies to pipe and joint design, to metallurgical advances, production methods and quality control. Within this period, for example, great strides have been made through research in the modern laboratories of the industry. Cast iron pipe has been the standard material for underground mains for nearly three centuries. That it is the standard material today is evidence that pipe founders are keeping abreast of Progress.

Identify cast iron pipe by the "Q-Check" registered trade mark. It is made in diameters from 1¼ to 84 inches.

SIMPLEX VENTURI TYPE METERS



Roberts Filter Mfg. Co.
Equipment Contractors

Pump Floor of Rocky Mount, N. C., Filtration Plant showing Simplex Type MO Meters

Wm. C. Olsen
Cons. Eng.

Simple in design, rugged in construction, Simplex Meters are selected wherever extreme sensitivity and accuracy of measurement are required.

Designed to measure accurately over wide ranges of flow, with low unrecoverable head losses, Simplex Meter Registers can be supplied for any service.

Whether actuated by Simplex Venturi tubes, and Nozzles, or by Simplex Pump Casing Taps, the stringent requirements of designing and operating engineers are satisfied by their use.

Write for Data

SIMPLEX VALVE & METER CO.
6743 UPLAND STREET • PHILADELPHIA, PA.

Grease, Gulls and Grease! A Real Problem at Ward's Island. Here Is the Surface of One of the Primary Clarifiers.

ATTENDANCE RECORD SMASHING BECOMES HABIT OF N. Y. S. S. W. A.

New Ward's Island Plant Featured on Program Followed by Inspection

RECORDS in attendance, established year after year by the N. Y. State Sewage Works Association, seem to be made only to be broken each succeeding year. The arrangement of holding the Annual Winter Meeting of the Association on the day following the meeting of the Sanitary Engineering Division of the American Society of Civil Engineers, introduced in 1937, has proved to be a happy one. The record registered attendance of 280 at the 1937 meeting, this year was bettered by 36 to establish a new official registration record of 316, and estimated attendance of about 350 for the 10th annual meeting.

Following another recently established custom, the annual joint dinner (Sanitary Eng. Division of A.S.C.E. and N.Y.S.S.W.A.) was held at the close of the meeting of A.S.C.E.'s sanitary engineers on January 20th, and ended in time for members to attend the Society's annual smoker. The principal speaker was the President of the Am. Society of Civil Engrs., Prof. Henry E. Riggs, of the University of Michigan.

On the following day, January 21st, was held the meeting of the New York State Sewage Works Association; on that evening the Annual Meeting of the Board of Control of the Federation of Sewage Works Associations; on the day following, Saturday, the 22nd, the joint trip of inspection (A.S.C.E. and N.Y.S.S.W.A.) to the new Ward's Island Treatment Works of New York City, but recently placed in operation.

"Better Sewage Works"

(Gascoigne's Luncheon Theme)

The annual luncheon was attended by 231 members and guests, thereby establishing another record. From California to New England came many guests, from 14 different sewage works associations within the Federation, who were introduced by President Chas. C. Agar in his "Roll Call of the States." Thereafter Mr. Agar highlighted the outstanding developments of the decade (1927-1937) in the sewerage field and in the Association since its beginning ten years ago.

C. Geo. Andersen, Supt. of Sewerage, Rockville Center, L. I. (New Member Executive Committee); N. L. Nussbaumer, Cons. Engr., Buffalo (New Vice-President of the Assn.); A. F. Dappert, Engr., Albany (To Him a Vote of Appreciation as Retiring Chairman, Rating Committee).

"Better Sewage Works" was the theme presented by guest speaker—George C. Gascoigne, Cleveland Consulting Engineer—in his address at the close of the luncheon.

In his splendid presentation, Mr. Gascoigne, well equipped by years of experience in promoting, designing and supervising operation of sewage works, set forth many pertinent factors; singled out good and bad practices in attaining success in the matter of securing "Better Sewage Works." Brimming full of meat, it is hardly possible to present here an effective digest of Mr. Gascoigne's commentary, which will appear in a forthcoming issue of Sewage Works Journal.

Amongst the highlights of the address was his analysis of "Involved Interests" in securing more and better treatment plants, wherein overlapping of interests and functions of state, federal and municipal authorities, and consulting engineers, was a real handicap, necessitating clarification and cutting back for the best interests of all and greater success in attainments. In respect to

Fred J. Biele, Incoming President

Chas. C. Agar, Retiring President

Wellington Donaldson (Operation)

Prof. Chas. L. Walker (Research)

To Them, Kenneth Allen Awards

State Sanitary Engineers, their efforts directed at present to detailed design checking, plant operation and operator training were robbing this group of needed opportunities to do important missionary and promotional work. Municipal engineers were too often attempting technical design, for which qualified practicing engineers were far better qualified. The consulting engineer's role was, in the speaker's eyes, primarily that of evaluation and selection of process, plan and equipment, for procuring the best balance in plant design, performance and treatment economics. In addition, and not least, was his role in the important coordination of the working forces involved in sewerage projects. The chief deficiency of the average designing engineer, according to Mr. Gascoigne's appraisal, was his lack of plant operating experience and, therewith, the lack of the viewpoint of the operator. Such weakness had usually been the chief cause for criticism of designing engineers.

Concerning qualifications of sales engineers and other representatives of manufacturers, Mr. Gascoigne commented that the chief difference between this "interest," and others involved, was that what this group had to sell was just a little more obvious perhaps. He lauded the qualities, cooperation, and valued services secured from the high grade sales-engineer of today; likewise, the improved follow-up service of successful and dependable manufacturers. The day when the manufacturer could consider his interest and obligation completed with the securing of the order had passed; and, the "back-door" tactics of a few poor losers was to be deplored as an evil working to the detriment of all involved. In the same category he placed the chiseling type of contractor, dragging in extras and resorting to petty arguing and discrediting the engineer, in attempts at side stepping obligations.

Concerning plant managers and operators, whose responsibility is a continuing one in the matter of "Better Sewage Works," Mr. Gascoigne pointed to a marked difference in qualifications of experienced and seasoned operators as contrasted to novice or pseudo operators. While the former sought to cooperate with engineer and equipment producers, seeking and securing help from both, the deficiency of the latter was that of seeking self-glory by attempting major changes in plant arrangements, and in belittling the engineer through criticism of the grape-vine variety. Operators too frequently suffered from a hazardous mania or complex—"The Change Complex." This operator dementia had proved the bane of the engineer's existence.

In summary, Mr. Gascoigne stressed the fact that all interests must of necessity work in harmony on sewerage betterments, lest one sour note wreck the best of plans. As a parting suggestion to brother designing engineers who fail to keep close contact with completed projects, he warned that "No News Is Good News" can not be taken to indicate that all is well. Keeping in close touch with the new plant was the best antidote to ward off that costly operator dementia—namely, the unbridled "Change Complex."

Geo. B. Gascoigne, Cons. Engr., Cleveland (Guest Speaker)

Prof. Earle B. Phelps, Columbia Univ., New York City (Pasteur the First to Discover B.O.D.)

Awards

At luncheon the Kenneth Allen Memorial Award winners for 1937 were presented by Morris M. Cohn, Chairman of the Award Committee.

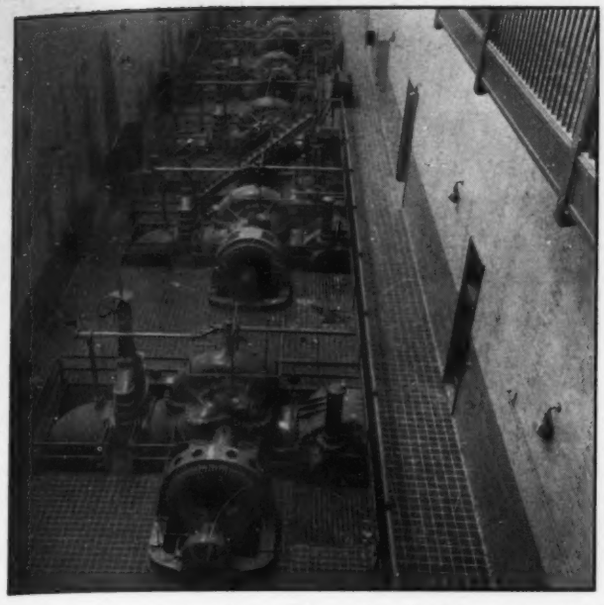
To Wellington Donaldson, Engr. of Treatment, New York Department of Sanitation, was voted the award for the best operating paper presented before the association during the year. His prize paper, "Preliminary Operations of the Coney Island Chemical Sewage Treatment Plant," presented before the 1937 meeting in New York City, has been published in "Sewage Works Journal."

Doctor H. G. Baity, Univ. North Carolina, Chapel Hill, N. C. (Time and Modesty Robbed Members of a Contribution from Him); S. T. Barker, N. Y. Dept. of Health, Albany (New Chairman of the Rating Committee); L. L. Luther, Supt. of Pub. Works, Freeport, L. I. (Main-Spring of the Lusty Long Island Section).

To Professor Chas. L. Walker of Cornell University was voted the award for the best research paper. His prize paper, "The Effects of Activated Carbon on Sludge Digestion," also presented before the 1937 meeting in New York City, has been published in "Sewage Works Journal."

In presenting the report of the Rating Committee earlier in the meeting, A. F. Dappert, Chairman, announced that the first award, for the best kept plant operating-log and reports, had been voted to H. O. Johnson, Supt. of the Bellgrave Sewer District, Great Neck, L. I.

(Since the award, in the form of a silver cup, was presented to Mr. Johnson at the 1937 Spring Meeting, as reported in our July issue, the announcement was for the purpose of record, along with the other awards of 1937.—Ed.)



4 Partial View of the Pump Pit at Ward's Island, 90 M.G.D. Units.

Business Meeting—Resolutions

To the Association in business session, Secretary-Treasurer Arthur S. Bedell reported a gain of 100 new members during 1937—raising the total membership to approximately 500 active and 21 associate members. Of the active members 33 per cent or better are superintendents and operators. The Association has two going sections—the Long Island and the Genessee Valley Sections—with a third group now petitioning to establish a Western New York Section for the Buffalo area. With a membership of 108 (restricted to Long Island operators and managers) the Long Island Section holds energizing quarterly meetings in addition to the three meetings of the Association during the year.

D. B. Keehan, Acting Chief Engr., Ward's Island Works

Richard H. Gould, Chief Engineer, N. Y. Treatment Works and Interceptors

Indicative of the satisfactory condition of the treasury, Mr. Bedell reported $2,900 receipts and $1,945 expenditures in 1937.

A report from the Committee on Research, presented by Prof. Lewis V. Carpenter of New York University, listed the more important studies under way at the new Joint Experimental Station of the University and New York's Department of Sanitation.

Reporting for the Emblem Committee, Fred J. Biele, Chairman, stated that no single emblem design, submitted in the competition, had seemed to be completely suitable and therefore the Committee was evolving a composite design from individual designs with features most suitable. Because of this development, the following members who had submitted designs receiving the highest number of votes would each receive the emblem (pin or fob) as struck—G. W. Spiers, A. E. Martin, A. F. Dappert, Prof. H. N. Ogden, A. J. Daidone.

Reporting for the Committee on Legislation, Robert Wheeler, Chairman, recommended that resolutions be drawn to request a change in New York's sewerage financing law, pertaining to the sale of revenue type bonds. At present such bonds in New York State could only be sold to the Federal agency assisting in the financing, and such restricted sale should be eliminated.

Victor Greiff, Electrical Engr., Dept. Sanitation, N. Y. C.; J. L. Barron, Chief Engr., Westchester Co., Dept. Health; Henry Liebman, Mechanical Engr., Dept. Sanitation, N. Y. C.

A second comment by the committee was that the New York anti-pollution law under which the State Health Department now functioned was far too restricted in scope to preclude conflicts of purpose and interference of interests, since it was restricted to health menace alone and proof of such before action could be taken. The need for a law of broader scope of application and Health Department jurisdiction was emphasized and a resolution requested.

In a later session proper resolutions were presented and passed to cover the above recommendations; (1) To provide an unrestricted market for revenue type sewerage bonds from New York State; (2) Redrafting of the anti-pollution act so as to eliminate conflicts and broaden the law under which the New York Department of Health operates, so as to include nuisance as well as direct menace to the public health created by stream polution.

The Battery of Turbo Blowers at Ward's Island. Capacity, 42,000 C.F.M. Each. In the Pit Below Are the Six Gigantic (90 M.G.D.) Pumps.

Officers Elected—Meetings Scheduled

President—Fred J. Biele, Cons. Engr., Huntington, L. I.

Vice-Pres.—N. L. Nussbaumer, Cons. Engr., Buffalo, N. Y.

Sec.-Treas.—A. S. Bedell, Department of Health, Albany, N. Y.

Ass't Sec'y-Treas.*—J. C. Brigham, Dept. of Health, Albany, N. Y.

Elected to the Executive Committee (3 yr. terms)—Engr. Henry T. Ryon (Albany); Supt. C. George Andersen (Rockville Center, L. I.); Prof. W. E. Stanley (Ithaca); Supt. Arthur T. Cary (Fairport).

The Spring Meeting is to be held June 3rd and 4th in Buffalo.

The Fall Meeting scheduled for October 6th-8th in Hartford, Conn. (Hotel Bond), is to be the second joint meeting with the New England Sewage Works Assn. Manufacturer's exhibits, usually scheduled for Spring Meetings, will on this account be postponed until the Joint Fall Meeting.

Past Presidents and Officials of N.Y.S.S.W.A.

Standing: Linn H. Enslow (1936); John F. Skinner (1931); A. F. Dappert (1933); Chas. A. Holmquist (1930); L. L. Luther (Secy., Long Island Section); Robt. C. Wheeler (Auditor); E. B. Besselievre (1934); Arthur S. Bedell (Secy.-Treas.).

Sitting: Prof. Earle B. Phelps (1932); Chas. C. Agar (1937); Chas. A. Emerson (Chairman of the Federation); Fred J. Biele (1938).—(Note—Kenneth Allen, the First President (1929), Died Some Years Ago.)

Technical Sessions

The technical sessions were opened with a review by Secretary Bedell covering—"The First Decade of the New York State Sewage Works Association"—which interestingly recited the highlights in the history of the Association; conceived in 1926, before the beginning of the Federation of Sewage Works Associations; came in as the 11th member association, to grow from a membership of 152 in 1929 to better than 500 within the decade. In memory of the first president, two Kenneth Allen awards were now given annually. Mr. Bedell also recounted activities of the Association in establishing the Plant Rating Award and Gadget Awards; fostering Operators' Schools and research, and the recent Operators' Licensing Act. Last, but not the least, had been the branching out of N.Y.S.S.W.A. into three sectional divisions to provide more accessible and frequent meetings for plant operators and managers.

Minnesota — Rhode Island — Ohio — New York — Illinois

(1) From Minnesota, Geo. Schroepfer, Asst. Chief, and C. C. Wilbur, Chief Engr., Twin Cities Sewerage Comm.; (2) Charlie Richardson, Sales Mgr., Builders Iron Foundry, and Alvin Bugbee, Dean of Sewage Works Managers, Providence, R. I.; (3) Ralph Sweeny, Chief of the Gadgeteers Tells One to Bob Allton, Just Ready to Start His New Plant at Columbus, Ohio; (4) Bill Carpenter, N. Y. Sanitation's Long Time Chemist, and Doc. Floyd Mohlman (Ed., Sewage Works Journal), Break Off "Shop" to Smile for the Little "Mackinette" Candid.

Wm. Raisch, Consulting Engr., N. Y. C. (Thanks Voted Him as Chairman of Local Arrangements)

J. C. Brigham, Asst. Engr., N. Y. State Dept. Health (Sec'y Bedell's Newly Appointed Assistant)

"Sludge Digestion and Digester Inspection at Rockville Center"—by C. GEORGE ANDERSEN, Supt. of Sewerage, Rockville Center, L. I.

Mr. Andersen described the Rockville Center digestion tanks, of depressed roof design with cast-iron heating coils, connected to a 5,000 cu. ft. gas holder supplying two gas engines. To the digesters, mixed crude and activated sludge is added, the latter first being concentrated to between 2 and 3 per cent solids (6,000 gals. reduced to 1,000 gals.) in order to reduce the volume of

Prof. Henry N. Ogden (Retired), Cornell University (Continues His High Interest in the Association); E. J. Lafferty, Engr., Dept. of Sanitation, N. Y. C.; Almon L. Fales, Metcalf & Eddy, Engrs., Boston (One of America's Pioneer Sewage Works Operators—"Quiet Waters Run Deep").

*A new office created this year.

Harry Schlenz, Vice Pres., Pacific Flush Tank Co., Chicago; Prof. Harry E. Miller, Univ. of Michigan, Ann Arbor (Chairman Exec. Comm. A.S.C.E. Sanitary Division); Henry W. Taylor, Cons. Engineer, New York.

supernatant liquor and minimize digester disturbance. In the concentration step, 300 to 400 lbs. of hydrated lime is added to 1,600 cu. ft. of sludge. Sludge additions to the digesters vary between 2 and 5 per cent, calculated on pounds of volatile matter in the digester contents and the undigested sludge. Every 8 weeks the practice has been to turn the digester contents over by recirculation through the sludge pumps. During the colder months (November to May) hydrated lime is added, during recirculation, in the ratio of 500 lbs. to 60,000 gals. of digester contents which is 50 per cent liquid. Digester supernatant has averaged 850 p.p.m. suspended solids and a B.O.D. value of 200 to 1,200 p.p.m.

Concerning solids removal through the plant, the sludge records had indicated removals of 1,530 lbs. of dry solids per million gals. of sewage treated; the analytical data on crude sewage and plant effluent had indicated 1,430 lbs./m.g. removed. The effluent from the final clarifiers averaged 43 p.p.m. suspended solids, such being further reduced to 11 p.p.m. by mechanical filtration through two drum type vacuum filters.

After 8 years in continuous service the digesters had been emptied for inspection and possible repairs. The scum layer, largely of undigestible materials, was found to be only 10 inches thick; on the floor, however, much grit had accumulated. There had been no attack of the concrete or metal parts within the digesters. On the cast-iron heating coils a porous lime carbonate scale (3/16 inches thick) had been deposited. This had been easily knocked off and, by subsequent temperature readings of input and return hot water, proved not to have been insulating to any practical degree. Corrosion of the coils was conspicuously absent. Mr. Andersen's lantern slides pictured these conditions and also the blower and safety equipment employed in preparing the digester for entry and inspection were pictured. For such work his preference was for the hose and a blower, the reason being insurance of full oxygen supply, non fogging of mask lenses, ease of breathing. Examination of specimens of scale removed from the heating coils showed it to be laminated, and interspersed with sludge solids, with many unexplained "pin-holes" extending through the scale.

"The Utilization of Sludge Gas at the Coney Island Treatment Works"—by WELLINGTON DONALDSON, Engr. of Treatment, and HENRY LIEBMAN, Mechanical Engr., Dept. of Sanitation, New York City.

The paper, introduced by Mr. Donaldson, and continued by Mr. Liebman, set forth experiences in operating the sludge digesters and gas engines at the Coney Island Plant of New York City. Interesting to many was the fact that no foaming troubles had been experienced in starting the digesters. Total production of gas could not be evaluated, due to the leakage of much of the gas not metered to the three Worthington gas engines (300 B.H.P. rating each) direct connected to 250 K.V.A. generators operated at 360 to 400 r.p.m.

Mr. Liebman, in describing the engines, stated that they were of heavy design, making conversion to Diesel type possible, and were provided with heavy lined cylinders subject to three reborings. Oil wiper rings, added to the pistons, had made an appreciable improvement and the good quality (low sulphur content) of the gas had made for very infrequent regrinding of valves. The engine specifications had been especially drawn to insure constant voltage from the generators and, thereby, make permissible changes in pump motor speed (pumping rates) through speed changes by throttle setting on the engines. Such an arrangement permitted automatic pump control.

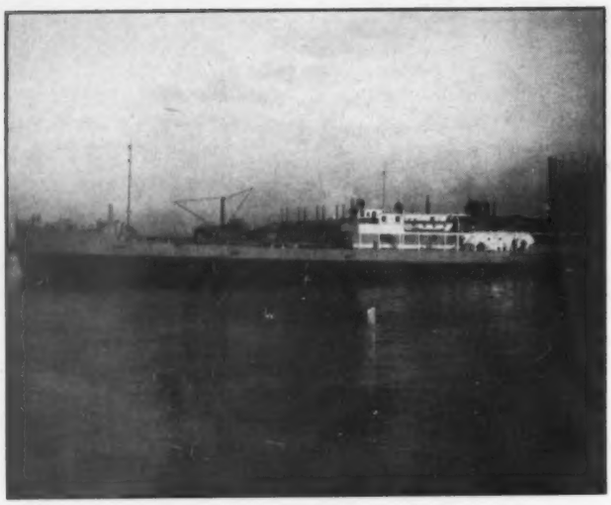
Concerning heat recovery, exhaust gas at 1,050 deg. F. was reduced to 200 degrees in passing through heat exchangers of the floating head type, resulting in a recovery of 50 per cent of the heat. The stainless steel tubes had granulated, due to the fact that such efficient cooling had caused exhaust condensate to form in the ex-

At Ward's Island

(1) Dorr's Kivel; Clint. Decker (Birmingham, Ala.); Dr. F. W. Mohlman (Chicago); (2) The "Inspectors" Arrive on the Island Under Guidance of N. Y. Sanitation Dept's. Asst. Chief Engr., "Bill" Sylvester; (3) Sylvester to Hansen (Chicago)—"What's Wrong with That Sludge, Paul?"; (4) Two Pipes—One Match—Two "Hypo-Chlorinators," Jeff Corydon and "H.T.H." Highberger.

Mass. — Ga. — Ala.

John H. Brooks, Supt. Sewerage, Worcester (President of New England Sewage Works Assn.); G. R. Frith, Asst. Engr., Ga. Dept. Health, Atlanta; M. E. Boriss, Acting County San. Engr., Birmingham (In Charge of Sewage Treatment Works).



The First of Three Sludge Vessels to Ply Between Ward's Island and the Dumping Grounds at Sea.

changers. Special attention had been paid to engine foundations, consisting of a concrete block 10 ft. deep resting on piles, and resulting in exceptionally little engine vibration.

Concerning operating data, the engines had supplied all power required, during the past 15 month period, without a hitch. Recent inspections had shown no cylider or bearing wear beyond normal. Efficiency tests at various tmies had shown 9,500 B.T.U. consumed per B.H.P./Hr., consuming on the average 17.3 cu. ft. of digester gas per B.H.P./Hr.

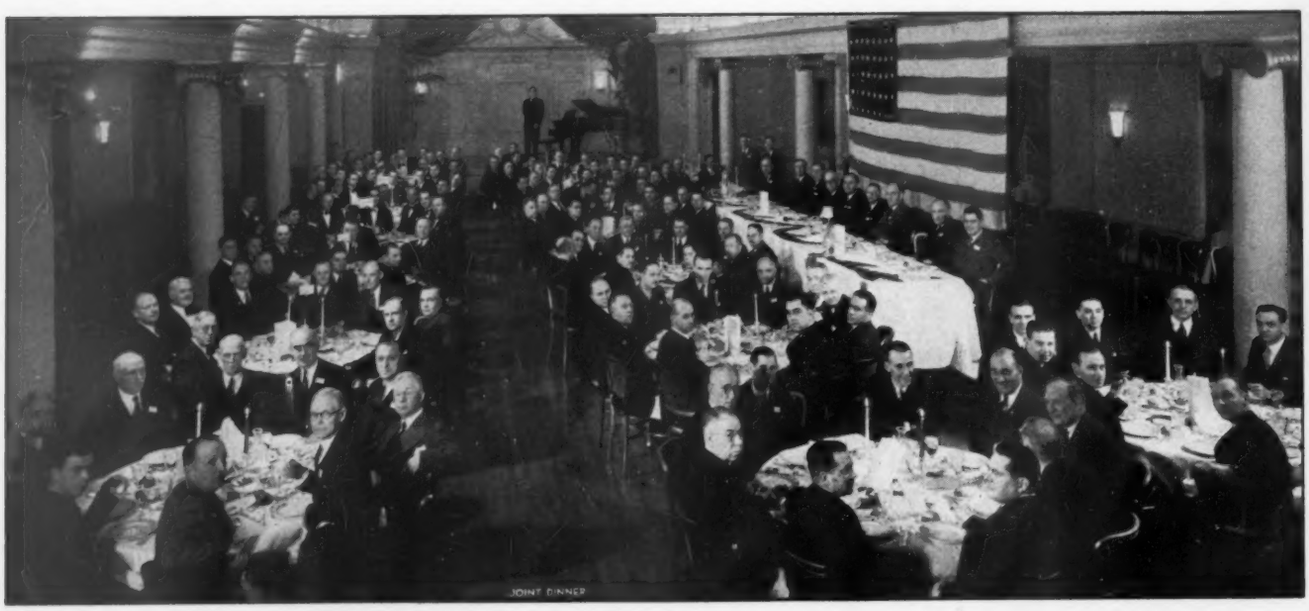
(The Coney Island Plant operates as a plain sedimentation plant in winter and a chemical precipitation plant in summer. The gas engines supply all necessary power for complete plant operation and pumping. Sludge transferred, by program pumping to the digesters (each with its separate gas holder), averages 8.7 per cent solids.—Ed.)

"The Ward's Island Treatment Works in Service" —by RICHARD H. GOULD, Chief Engr., Sewage Disposal and Interceptors, Dept. of Sanitation, New York City.

Preparatory to the inspection trip, scheduled for the day following, Mr. Gould presented an illustrated description of the Ward's Island Plant placed under construction in 1931, resumed in 1935, and completed in 1937 at a cost of $12,400,000, and placed in operation last October. Eventually to treat the sewage from 20 per cent of New York's population, this plant is now provided activated sludge treatment to 50 per cent of the flow reaching it. Interesting was the disclosure, that 3 days after starting aeration a well clarified effluent was being produced. Of unusual interest were the gigantic sewage pumps of 90 m.g.d. capacity, which had been set up and tested by the manufacturer on scows in the river before installation. Also of marked interest was the first of three new rakish and trim sludge vessels, especially designed for transport of undigested sludge to sea, and just placed in commission by the Department of Sanitation. Mr. Gould remarked upon certain operating troubles of unexpected magnitude. The grit chambers on Manhattan and in the Bronx had received many tons of coal, cinders, brick-bats with but little let up. On the primary clarifiers grease and scum accumulations had been many times that expected, and scum handling was the chief problem of the day. Under construction were incinerators designed to burn scum, but keeping abreast in its removal from the tanks was the subject of immediate investigation. The exceptional condition, for other than sewage heavily loaded with grease and packing-house wastes, was clearly in evidence at the time of the plant inspection. (See picture.) Another problem at Ward's Island is the handling and holding of the activated sludge in a manner which will eliminate as much water as possible, to reduce the frequency of sludge vessel trips to the distant dumping area. Present indications are that this phase is a problem which will become of considerable magnitude with the arrival of warm weather and rapid mortification of "pig-pen-privy" odor producing activated sludge. To date the mixed sludges have been concentrated to 5.7 per cent solids before discharge to the sludge vessel. (Another problem which was not pointed out by Mr. Gould is the sea-gull problem—May none of the numbers seen around the plant get into Donaldson's sludge pumps—or too much in his "hair."—Ed.)

"Biochemistry in Sewage Treatment"—by EARLE B. PHELPS, Professor of Sanitary Sciences, Columbia University, New York City.

With characteristic "Phelpsonian" ease and clarity of presentation, did Professor Earle B. take his audience



Joint Dinner Sanitary Engineering Division of Am. Soc. C. E. and N. Y. S. W. W. A.

back to the beginnings of biochemical conceptions in the treatment of sewage and on up through the years, now history, to the present day understandings of the biochemical processes. Many in his audience had never heard the topic reviewed; none had heard it reviewed more interestingly. Starting with the discoverer of bacterial phenomena and fermentation, he said that Louis Pasteur was the true discoverer of biochemical oxygen demand, leaving it to later generations to label it the "B.O.D." Then Profesor Phelps took his audience to the "First Report of the State Board of Health of Massachusetts" from which he quoted an exposition contained, based on the Lawrence Exptl. Station studies, to the effect that "bacteria, oxygen, organic matter and proper temperature were all essential factors in nitrification." Then he pointed to the statement of Sedgwick, of sanitary-chemistry fame, who said in the early periods of slow sand filter experimentation (recalling that application of such filters was in sewage treatment before water purification), in effect, that the work of the filters could only be attributed to the bacterial jellies (zooglea) noted on the sand grains. Further, that "these filters seem to be respiratory mechanisms." In reality here was in a nut-shell the entire explanation of the work of the zooglea, responsible for carbon oxidation and nitrification, whether it be on filter sand grains, on stone, or in the form of flocs in the more modern activated sludge process.

To Dibden went the credit for recognition of specific stages in the purification process; namely, that—

(1) Adsorption of organic matter preceded oxidation.
(2) Oxidation was independent of nitrification.
(3) Nitrification was only the final stage of the cycle.

Said the Professor: Nothing has been added since of fundamental importance, subsequent developments being of the nature of application of principles, engineering improvements, rate betterments and refinements.

In pollution problems, degradation of the stream to nuisance proportions hinged on initial stages of organic matter oxidation. This proved the important factor, rather than the nitrification stage. And then Professor Phelps took his listeners through the early attempts to determine acceptability of effluents, such as Franklyn's incubation test; the Lawrence smell and color test, at the end of definite periods of incubation; the Methylene Blue Test of Germany's Spitta, which was the forerunner of his (Phelps') quantitative Methylene Blue Stability Test, based on the mono-molecular law of oxidation rates, to reveal the relationship between oxygen demand and available dissolved oxygen; finally the 5 day B.O.D. test of today, which likewise reveals the oxygen demand of the early stages only; and the contributions of the U. S. Public Health Laboratories, advancing the technic and the understanding of the test as it proceeds through the secondary (nitrification) stages.

The truly remarkable aspect of oxidation process was the rates—at which they proceeded—brought about by the effect of the floc or zooglea on which the organisms thrive. In the anaerobic phases of fermentation and digestion, in which the criteria is gas production, liquefication and reduction of volatil matters, progression follows the same mono-molecular laws that apply in oxidation, leaving eventually as the base 33 per cent volatil. Anaerobic breakdown taking place in distinctive stages (at least two), the rate proceeds at about half that of the speed of oxidation, to become exceedingly slow after a few weeks.

PROFESSOR H. G. BAITY, of the University of North Carolina, asked by the Chairman to say a few words concerning some of his observations pertaining to sludge oxidation and natural purification, was appreciative of the invitation but asked to be excused because the schedule was already running behind. He referred the audience to his paper on the subject, which is to appear in the March issue of Sewage Works Journal.

The meeting closed with a brief description of the proposed three short schools, of two weeks duration, for sewage works operators. Professor C. L. Walker spoke for Cornell University; Professor E. J. Kilcawley for Rensselaer Polytechnic; Professor L. V. Carpenter for New York University. It was noted that the new Operator License Act of New York State requires Grade A and Grade B operators to have completed a sewerage short school course. The Cornell school, scheduled for the period March 14-16, was to be limited to 10 students at a fee of $20.00 to cover tuition expenses. The same fee is to be charged by the other two colleges, at which dates for the schools have not yet been set.

▼

No. 1 A.W.W.A. Membership Salesman "Brings Home the Bacon"

With two cups won in 1937, the Indiana Section of A.W.W.A. has right to be proud of its prowess. On the left is the Nicholas S. Hill, Jr., trophy, which goes each year to that Section of A.W.W.A. making the largest percentage gain in new members. On the right is the Franklin Henshaw trophy, which is awarded that Section

Indiana Section Chairman and "Winnings."

showing the highest ratio of active member attendance to gross attendance at its meetings during the year. In this picture, John L. Ford (Chairman of the Section) has ample cause to beam a bit because he has, as Chairman of Membership Committee, proved to be Indiana's No. 1 A.W.W.A. membership-salesman. Other Indiana officers deserving a hand also, are Paul C. Laux (Anderson), Vice Chairman; John A. Bruhn (Indianapolis), Sec'y-Treas.; Howard A. Dill (Richmond), National Director.

FOR PRESIDENT OF A. W. W. A. REEVES NEWSOM

Honorary Membership Is Conferred on T. A. Leisen and R. W. Lawton; Wm. C. Mabee Voted the Diven Medal; V. C. Lischer Awarded the Goodell Prize

Reeves J. Newsom

PRECEDING the Winter meeting of the Board of Direction of the American Water Works Association, the Nominating Committee, composed of elected (Section) directors, went into annual session to select its nominee for presidency of the Association. The secret balloting is not disclosed but on the third ballot Reeves J. Newsom's name was declared unanimously chosen to be placed on the ballot as the single choice of the Committee. Unless another nominee is named by petition of the membership at large before March 1st, the official nomination is tantamount to election. So, without much question Mr. Newsom is to become President of A. W. W. A., April 28, 1938, during the New Orleans Convention.

Mr. Newsom, born in Columbus, Ind., 44 years ago, graduated from Purdue, thereafter completing a graduate course in M. I. T. Since his 20th birthday he has been a "Water Works man." For 12 years he was connected with municipally owned plants and for eleven years operated privately owned water companies. From Superintendent of the Lynn (Mass.) Water Department he became Lynn's Chief Engineer and Commissioner of Water. In 1926 he was selected to take charge of engineering and operation of the 43 water utility properties owned by Community Water Service Company, of which he later became President. In 1937 he resigned to enter private practice, with offices at 500 Fifth Ave., in New York City.

Mr. Newsom has long been a valuable member of A. W. W. A., serving on several important committees. For the past three years he has served as the member of its Board of Directors, from the New York State Section. After A. W. W. A. reorganization he was made a member of the Executive Committee of the Board which, with the Secretary, meets monthly to handle all important matters affecting the association.

Honorary Members

The Committee on Honorary Membership presented the names of Col. Theodore A. Leisen, General Manager of Water Works, Omaha, Neb., and Ralph W. Lawton, Cons. Engr., of Los Angeles, Calif., for honorary membership. The vote in each instance was unanimous.

Colonel Leisen has been a member of A. W. W. A. since 1904 and has served as president of the association (1917), and since in other capacities of value to the association. He is at present completing his third year as the member of its Board of Direction, representing the important Missouri Valley Section.

Mr. Lawton, has been a member of the association since 1906 and is the oldest living member of the California Section, which he helped to organize.

[After the meeting it leaked out that Frank A. Barbour, past president of A. W. W. A. and, by automatic succession, the retiring member of the Committee on Honorary Membership, had been named by his brother committee members as the third Honorary Member, but killed that nomination with his own vote, considering the nomination "patently unethical and untenable." We are happy to learn that Frank Barbour, who has put in many years of work for A. W. W. A., will have no voice in the selections of 1939.—ED.]

Awards

MR. WILLIAM C. MABEE, Chief Engineer, Indianapolis Water Co., was voted the John M. Diven Memorial Medal. The Diven medal constitutes an award "to that member of the association who has performed some outstanding service in the interest of the association." Mr. Mabee was selected in recognition of the splendid work done by him in leading his Committee on Specifications for the Laying of Cast Iron Pipe. Under his new guidance the work of this committee has speedily reached a point at which it can recommend complete specifications for adoption, as a tentative standard, subject to final adoption at the end of the required period following its publication as the tentative standard.

MR. VANCE C. LISCHER, Engr. in Charge of Production, St. Louis County Water Co., St. Louis, Mo., was awarded the Goodell Prize for his excellent paper "Water Hammer—Correcting an Unusual Problem," which was published in the March, 1937, issue of the Journal. A. W. W. A.'s John M. Goodell Prize is annually awarded some member in recognition of a "notable contribution to the science and practice of water works development," primarily as reported in the Journal during the calendar year. Mr. Lischer's paper is cited as an excellent solution to a typical water hammer problem, and therefore of much interest and benefit to water works operators and engineers.

MR. W. W. BRUSH, Treasurer of A. W. W. A., was re-elected to continue the service which he has so long rendered the Association.

▼

$34,000,000 DAM CONTRACT LET—The Interior Construction Co., of Oakland, Calif., has been awarded the contract at $34,442,240 for completing the Grand Coulee Dam. The dam will be 553 ft. high and requires the placement of approximately 5,250,000 cu. yds. of concrete. It will create a reservoir 151 miles long. The construction must be completed within four years.

Here's "Something to Show" for relief funds!

Typical section of Atlanta's new concrete pipe sewers. A well-engineered and well-constructed job with excellent alignments and uniform gradients throughout. Pipe is carefully bedded and back-filled; joints made with portland cement mortar to minimize infiltration. Work was executed by Works Progress Administration of Georgia, District No. 5, in cooperation with Clarke Donaldson, chief of construction and W. A. Hansell, assistant chief of construction in charge of sewers for City of Atlanta.

34 MILES OF ENDURING CONCRETE PIPE ADDED TO ATLANTA'S SANITARY AND STORM SEWER SYSTEM

Atlanta's 7-million-dollar program, including new sewage treatment plants, new sanitary and storm sewers, extensions and outlets, is now nearing completion. 34 miles of concrete pipe ranging in size from 8 in. to 102 in. has already been placed under various WPA and FERA projects.

Atlanta joins the Sanitary District of Chicago, Louisville, Detroit, Minneapolis and many other cities which rely on concrete for their sewers. Concrete pipe, like monolithic concrete, has proved its merits for a wide range of sewer types, sizes and conditions. It is strong and durable. Minimizes infiltration and leakage. Is moderate in cost and serves with little maintenance.

Whether your sewers are 12 ft. in diameter or a few inches, build them of concrete and be sure!

Write for pipe bulletins on jacking concrete pipe, building pipe sewers in open cut, pipe in tunnel, subaqueous methods, and standard specifications of the A.S.T.M.

PORTLAND CEMENT ASSOCIATION
Dept. A2-29, 33 W. Grand Ave., Chicago, Ill.
Please send me concrete pipe bulletins 9 to 14.

Name _____
Position _____
Address _____
City _____ *State* _____

ELGIN, ILL.

Exterior view and closeup of one filter bottom of new Elgin, Ill. water treatment plant. J. Albert M. Robinson, Consulting Engineer, Chicago. E. B. Lloyd, Plant Superintendent.

ANOTHER ONE OF 14 ALOXITE BRAND POROUS UNDERDRAIN SYSTEM INSTALLATIONS NOW IN RAPID SAND FILTER PLANTS . . .

THIS fine new plant, recently completed, has four filters with a total capacity of 5 M.G.D.—all equipped with Aloxite Brand R. S. F. Porous Underdrain plates.* It and thirteen other installations give evidence that the outstanding advantages of the porous underdrain system are being proved—***uniformity of backwash — reduced operating heads and cost — reduced filter height and cost—no graded gravel—no loss of sand . . .*** This new advance in filter design is now being used in all types of plants, some of which have been operated almost two years. Write for further details. Your inquiry will be handled by trained sanitary engineers. **Aloxite Brand Diffuser Tubes are also used for aeration and carbonation in this new plant.*

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RECLAIMING AND CEMENT LINING OLD CAST IRON PIPES*

By WILLIAM S. STAUB
Engineer, West Va. Water Service Co., Charleston, W. Va.

The Author

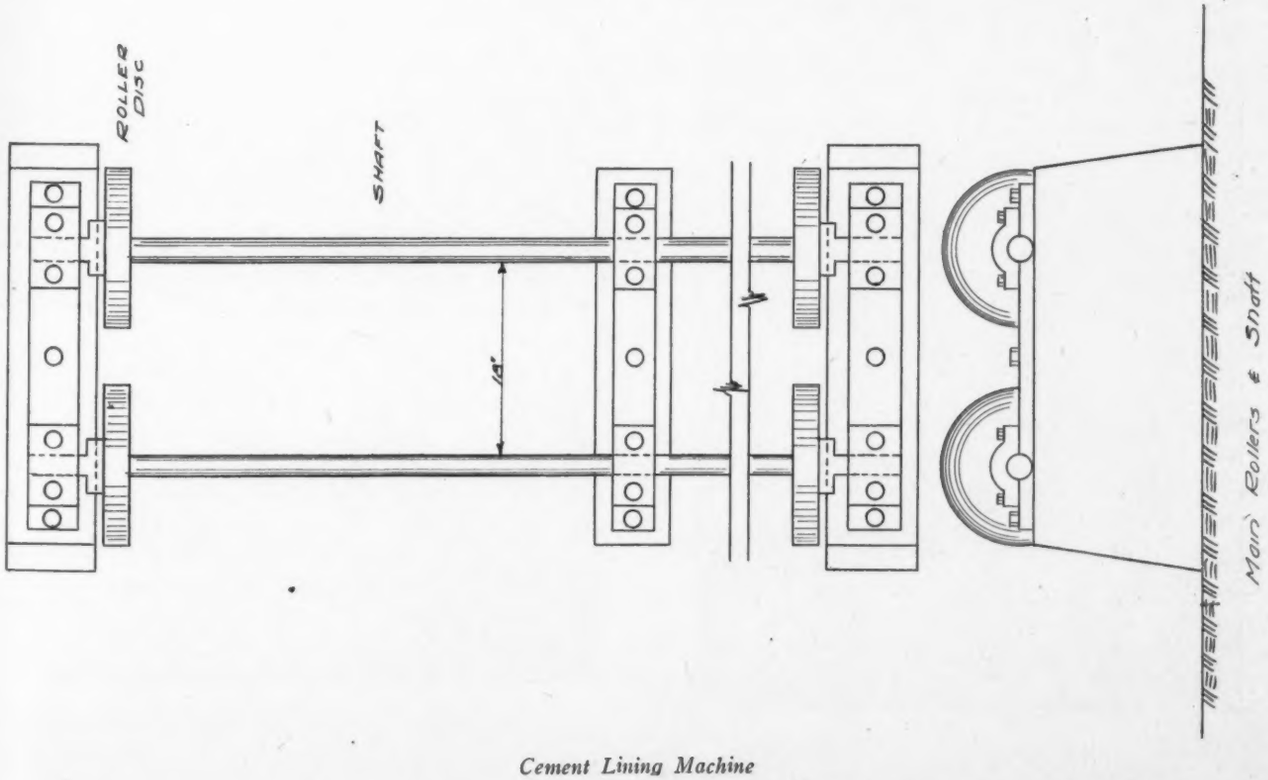
THE city of Nitro, West Virginia, is located on the Great Kanawha River, seventeen miles below Charleston, West Virginia. At the outbreak of the World War this town was designated as the location for a large explosives plant, to furnish material for the allied armies. The plant was nearing completion at the end of the war and was closed shortly after the armistice.

Among the large installations made at Nitro was a forty million gallon per day filter plant and many miles of distribution mains were laid, ranging in size from 2 in. to 30 in. cast iron, and to 48 in. wood stave. There were several separate and distinct types of mains: raw water supply lines, low pressure; settled water supply lines, high pressure, for fire protection; and filtered water for domestic consumption. Consequently, the abandoning of the plants and the reduction in the population to approximately 5,000 persons gave the city a greatly oversized system.

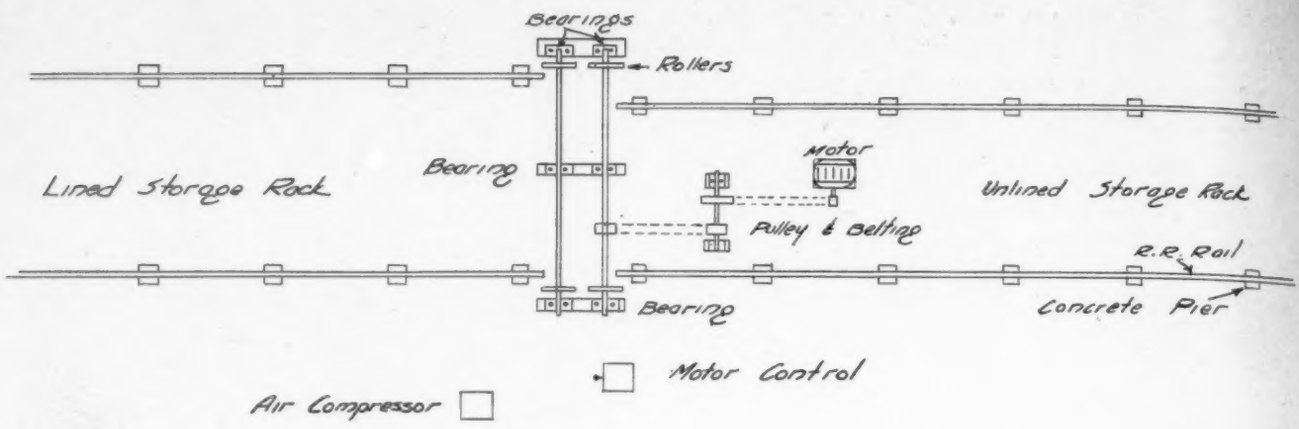
On March 1, 1935, the Nitro plant was acquired by the West Virginia Water Service Co. It was immediately evident that, by some systematic method, a large amount of pipe could be salvaged from this system for reconditioning and use elsewhere.

*A paper presented before the W. Va. Conference on Water Purification at Fairmont, W. Va., on October 21, 1937.

Pipe Lining Machine with Rack of Finished Pipes Beyond



Cement Lining Machine



General Plan of Cement Lining Plant

A Pipe Lining Plant Constructed

The first step was the installation of a cement lining plant capable of handling sizes of pipe from 2 to 30 in. This machine consists of a three-bearing shaft, on each end of which there is a smooth pulley which operates tangentially with a similar pulley which is on a dead shaft. (See sketch.) The pipe, to be cement lined, rests in a horizontal position on these four pulleys. There is a 5 h.p. variable speed, slip ring motor which is belt connected to the above line shaft. This produces the rotation necessary for the cement lining of the pipe.

The runway leading to the cement lining machine, and also away from the machine, is composed of 80 lb. rails mounted on concrete piers. This may be observed in the enclosed photographs.

The salvaging of the pipe, the excavating, removing pipe and fittings, hauling into the pipe yard, and the backfilling was all contract work. The pipe removal was contracted at a price per ton, and the fittings at a different price. The contractor used for this job a small clam-shell shovel, and tractor. Due to the fact that most all the work was done on unpaved streets there was no great expense incurred in this phase of the work.

The Gas-Jet Torch. Burns Tubercules Out of Pipes Up to 12 Inches Diameter

Preparing the Pipes

The pipe was stacked in the yard according to sizes. All broken or damaged joints were kept. However, the number of feet of pipe damaged or broken during the salvage process was exceedingly small.

These pipe stacks were so located on gradual sloping ground that we were able to operate, by gravity, a low wheel truck on narrow gauge track from any stack directly to the cleaning rack. This factor made the handling of all sizes of pipe very easy.

The pipe was brought to the cleaning rack by the above method and the process of cleaning begun. High pressure water streams were used to wash the mud from the interior and exterior of the pipe. The pipe was then ready to be heated. Pipe in sizes up to 10 inch is heated by placing a special gas-jet torch into each end of the pipe and igniting. These jets give the same action as a blow torch. The foreign matter, old paint, and scale is loosened by this burning. In the larger sizes of pipe (from 10 to 30 in.) the pipe is filled with wood and burnt. We have found that for the larger sizes of pipe these wood fires are cheaper than the gas and give equally good results.

After the burning, the pipe is again washed with high pressure streams and rolled on to the cement lining machine. The pipe is then rotated at about 300 ft. per minute, and if tuberculation is present a heavy iron bar is placed in the pipe. The action of the bar, plus the rotation, removes the tuberculation very effectively. The bar is removed and heavy wire brushes, attached

Loosening Tuberculation by Burning. In the Larger Diameters Wood Fires Are Used. In Pipes Under 12 Inches a Gas-Torch Is Used

Smoothing Up the Bell End After Lining

to a wooden pole, are slowly worked from end to end of the interior of the rotating pipe. This is continued until the interior is smooth. Wire brushes are also applied to the exterior of the pipe. The interior of the pipe is then cleaned by blowing out with compressed air under 125 pounds pressure.

The interior of the pipe is sprinkled and is now ready for cement lining. Between 30 and 40 lengths are cleaned before cement lining is started, so that the mortar may be mixed in larger quantities.

Lining Procedure

The sand that is used in the mortar is the best grade of Ohio River sand. This sand is screened through a mesh having 16 openings per inch. The cement used is a standard cement and this too is screened through a fine mesh in order to remove any large particles of foreign matter.

We have found that a mix of about 2 parts by volume of cement to 1 part of sand, with enough water to give a fairly heavy consistency mix, gives a good economical lining; and, from all observations, as good as one with a greater cement ratio.

The pipe to be lined is now placed on the machine and revolved at about 250 ft. circumferential speed per minute. A long metallic trough is filled with the mortar, inserted in the pipe, and dumped. The metallic trough is allowed to remain to smooth the mortar evenly on the surface. After this is done the trough is removed and the rotation of the pipe is increased to between 550 and 600 ft. per minute. This rotation is continued until the surface of the mortar is smooth and has a glistening lustre.

The excess mortar, at the bell end of the pipe, is removed by a wooden paddle and then wiped with a heavy cloth or glove, to prevent any difficulty in laying. The lining placed varies in thickness according to size of pipe, but we have found that this figure approaches near 3/16 inch for all sizes up to 16 in. diameter pipe.

The pipe is then rolled off the machine and a piece of "sisalkraft" paper (a heavy tar compound paper) is securely tied over each end of the pipe to prevent the rapid escape of moisture. The pipe then is given a good external coat of paint and placed on the curing racks. After 7 days the pipe is ready for use.

Reconditioning Fittings

Fittings are hauled into the warehouse for grading. There fittings are cleaned and burned with gas jets, scraped and painted.

Reconditioning Valves

Valves are hauled into the warehouse, where they are cleaned. They are torn down and the interior cleaned, oiled, and any worn parts, gaskets, or packing is replaced. The valves are then painted and sorted.

TABLE 1
Cost of Salvage
(Excavating, removing, hauling, stacking in yard)

Class C Size Pipe	Cost Per Ton*	Cost Per Ft.*	Class C Size Pipe	Cost Per Ton*	Cost Per Ft.*
4.....	16.00	.186	14.....	9.75	.568
6.....	14.00	.250	16.....	9.00	.646
8.....	12.50	.325	18.....	8.50	.743
10.....	11.50	.407	20.....	8.00	.833
12.....	10.50	.486	24.....	7.50	1.042

*These are contract prices which includes backfilling of trench.

TABLE 2
*Cost of Reconditioning**

Size Pipe	Feet Recond.	Labor	Material	Total Cost	Labor per ft.	Material per ft.	Total per ft.
4	5414	203.47	204.31	407.78	.0375	.0377	.0752
6	16513	882.03	898.71	1780.74	.0534	.0543	.1077
8	14070	996.79	983.97	1980.76	.0708	.0699	.1407
10	360	48.20	31.84	80.04	.1339	.0885	.2224
12	1471	279.45	144.79	424.24	.1897	.0983	.2880
14	432	114.50	72.91	187.41	.265	.1687	.4337
16	408	85.65	56.80	142.45	.2095	.1390	.3485
18	720	194.10	139.32	333.42	.2695	.1935	.4630
20	588	120.51	101.43	221.94	.2050	.1725	.3775
24	3233	719.70	1020.60	1740.30	.222	.316	.5380

*These figures are the average cost of cleaning, cement lining and painting C.I. Pipe, based on the total amount reconditioned.

TABLE 3
Cost per 1000 ft. to Clean, Cement Line and Paint C.I. Pipe

Size	Payroll	Cement	Sand	Paint	Gas	Misc.	Hauling	Total
4″	52.70	9.49	1.45	5.60	2.74	5.67	.....	77.65
6″	60.80	19.16	5.63	5.69	8.72	4.92	.....	104.92
8″	67.10	34.20	7.34	7.56	15.41	5.48	19.58	156.67
12″	130.20	44.70	12.20	14.10	.....	5.12	9.15	215.47
20″	204.90	78.20	13.58	30.80	.....	34.40	15.30	377.18
24″	211.00	130.09	44.60	22.65	15.64	36.60	105.20	565.18

The slight difference between the cost per foot and the cost shown on Table No. 2 is due to the fact that these data were taken from individual work orders.

TABLE 4
A Typical Work Order

Clean, cement line and paint 1669 ft. 8 in. Class C, C.I. Pipe.

Payroll		
244 hours @ .35	85.40	
9 hours @ 1.30	11.70	
		$97.10
Material		
6 No. 5 Wire Brushes @ 0.283	1.70	
88 sacks cement @ 0.52	45.76	
2 12 quart pails @ 0.72	1.44	
6 No. 1780 Wire Brushes @ 0.283	1.70	
2 Cu. Yd. Sand, No. 5450, @ 3.38 per yd.	6.76	
1 Roll Sisalkraft Paper @ 6.54	6.54	
1 Ball Twine @ 0.59	.59	
11¾ gal. Tung Paint @ 1.19	13.98	
Natural Gas	5.30	
		83.77
Total Cost		$180.87

Cost per ft.: Labor, .0582; material, .0503—total, .1085.

TABLE 5
Cost to Salvage and Recondition C.I. Pipe

Class C Size Pipe	Cost to Excavate Haul, Backfill Per ft.	Cost to Clean, Cement Line, Paint Per ft.	Cost Pipe Ready for Use Per ft.	Per Cent Comparison*
4	.186	.0752	.2612	34.7
6	.250	.1077	.3577	31.85
8	.325	.1407	.4657	28.5
10	.407	.2224	.6294	28.3
12	.486	.2880	.7740	27.0
14	.568	.4337	1.0017	27.6
16	.646	.3485	.9945	22.5
18	.743	.4630	1.2060	22.4
20	8.33	.3775	1,2105	18.9
24	1.042	.5380	1.5800	18.5

*Column 5, comparison per cent, shows the per cent of cost of salvaging, cleaning, cement lining and painting to the cost of new cement lined pipe laid down in our yard at Charleston. The base is $50.00 per ton for Class C pipe, Burlington, N. J.

Left: Trimming Up a Pipe End; Beyond Are Burned Pipes Being Flushed Clean Preparatory to Wire Brushing. Right: Liner at Work, Dumping the Mortar-Trough at 250 Ft. Per Min. Circumferential Revolving Speed; Later Speeded Up to 550 Ft. Per Min.

Costs

Pipe: In the accompanying tables are shown the average cost of salvaging and reconditioning pipe. These figures represent the average cost for the total amount of pipe reconditioned to date.

Fittings: The work orders for reconditioning fittings have included fittings of all sizes. Consequently it is impossible to determine the cost per size-ton to recondition. The actual cost per ton, based on the total weight of fittings reconditioned to date, has been $8.18 and the cost of salvaging between $7.50 for 24 in. to $16.00 for 4 in. fittings.

Valves: The work orders covering the reconditioning of valves also include valves of many sizes, and the cost for each size valve cannot be determined. In a great many cases, in reconditioning valves, it was necessary to replace working parts; consequently, the average cost of $5.95 per valve includes repair and reconditioning. In all, 135 valves were reconditioned, only 6 being larger than 12 in.

Hydrants: The price per hydrant also includes repair and reconditioning, the average cost being $5.87 per hydrant for the 42 that were reconditioned and repaired.

▼

Automatic Bin Level Indication and Control

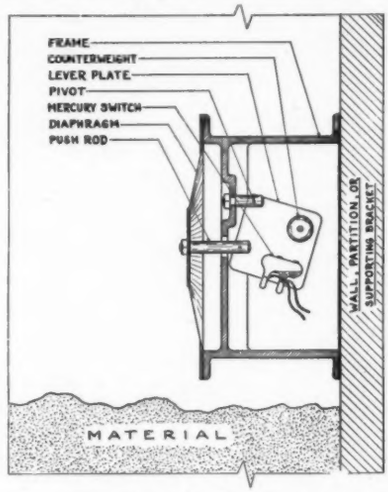
By GEORGE A. SCHEMM
Detroit, Michigan

The adaptation and potentialities of bin-level indicators in handling, storing, and controlling water-works and sewerage chemicals seems to be news to engineers and chemists in these fields. On this score, and upon invitation of WATER WORKS AND SEWERAGE, this brief article is being contributed.

An indicator for the purpose of handling bulk materials, developed by a cement manufacturer prior to 1930, has since found increasing adaptations in the industrial field. It has been marketed under the trade name—"Bin-Dicator."

This device is essentially a diaphragm-operated mercury switch, which is actuated by the lateral (or upward) pressure of liquid, pulverized or granular materials against the diaphragm. When the pressure of material is relieved, the switch is returned to normal position by a counterweight, as indicated in the accompanying cross-sectional drawing. (The Bin-Dicator here illustrated is of the type designed for interior mounting in rigid walled single or multiple compartment bins. Another standard model, for exterior mounting on thin walled bins, employs the same patented operating mechanism.)

The Bin-Dicator may be mounted on the vertical or sloping side of a bin, hopper or tank to indicate when the container is full, partially full, or empty. It may be mounted on an elevator boot, or conveyor, to indicate overfeed or choking. Wherever mounted, it provides positive operation of a mercury switch whenever the material exerts a pressure on the diaphragm. Bin-Dicators mounted on bins, elevators, conveyors, and weighing devices throughout the plant can be connected to signal panels at centralized control points. Operating conditions can thus be communicated to one or more strategic points in the plant, making possible greater efficiency and more dependable operations.



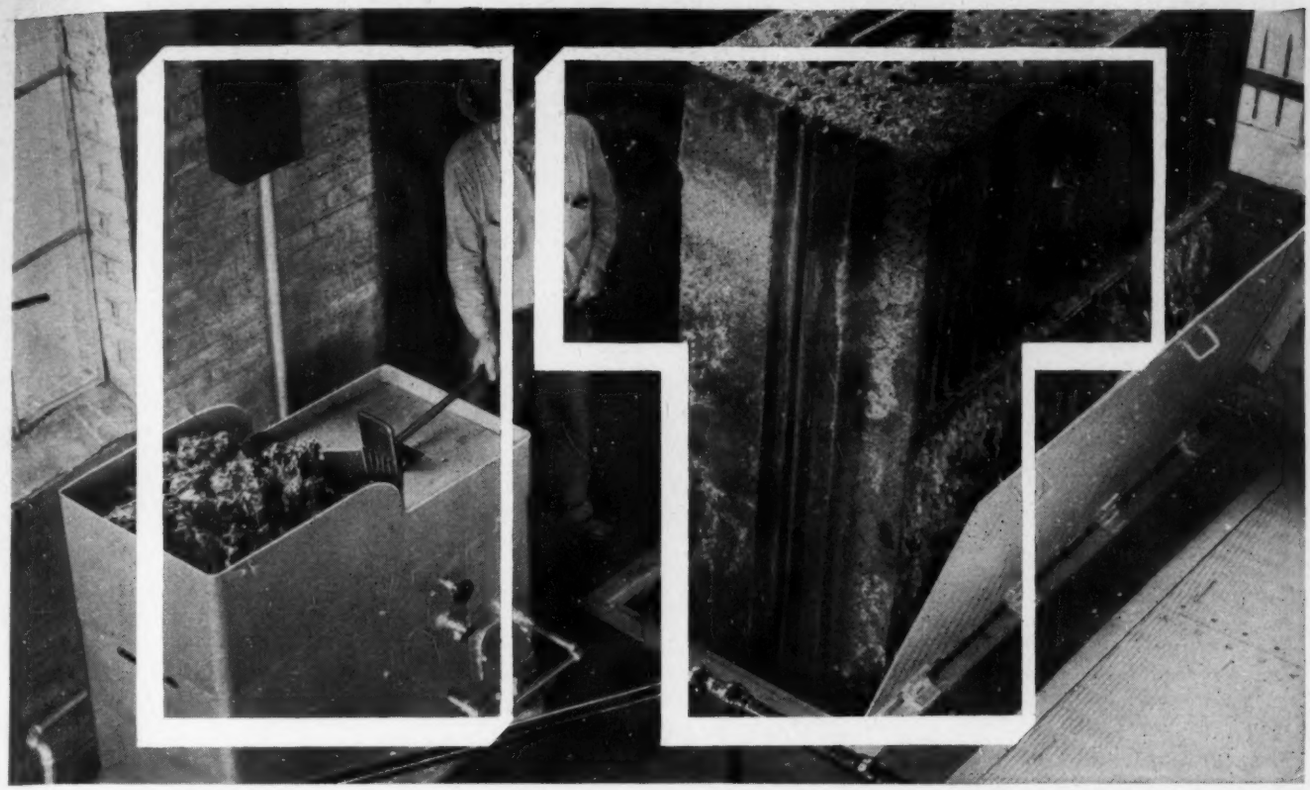
The Model C. Bin-Dicator

Automatic control of feeders, elevators, conveyors, and the level of material in bins, may be accomplished by connecting two level indicating Bin-Dicators directly to motor control circuits. Overfeeding or choking in elevators or conveyors, may be indicated at remote points by this device, and connections may be made to provide emergency shut-off of any motor-driven machinery. These devices are now being used on more than 100 different bulk materials, varying in weight from 13 to 250 lb. per cu. ft., and also on many liquids and semi-liquids.

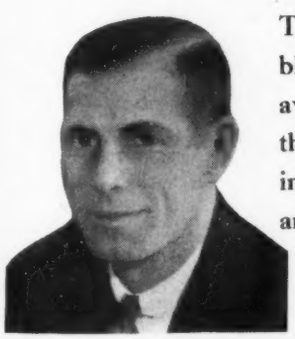
Especially is bin level control equipment of interest in those plants which are effecting maximum economies through the utilization of chemicals purchased in bulk and handled by air, or mechanically, in and out of storage vaults, or bins, to weighing machines and feed hoppers. And, in smaller plants, automatic control in the refilling of machine hoppers may serve a useful purpose where continuous operator attendance is not provided.

Two important sewage treatment plants (Chicago and Niagara Falls) have recently been Bin-Dicator equipped. The units are operating on coal, dry chemicals and sludge.

HOW TO HANDLE



IF *IT* IS DISPOSAL OF SCREENINGS



The Rex Triturator is probably the most efficient method available to the engineer for the disposal of sewage screenings. Large rags, towels, sticks and other solids are chopped to bits by whirling blades that cut *more than a million times a minute!* The Triturated screenings are then returned to the sewage flow.

The Triturator's revolutionary performance lowers power requirements and lowers the cost of flushing water below that of hammer mills and other types of machinery previously used for this purpose.

This accurately balanced machine is a complete unit—connect water and power lines and it's ready for work. There's nothing else to buy — nothing more to furnish.

This handy coupon will bring you your copy of the Rex Triturator Catalog. Fill it in and send it today!

SANITATION REX EQUIPMENT

CHAIN BELT COMPANY
OF MILWAUKEE

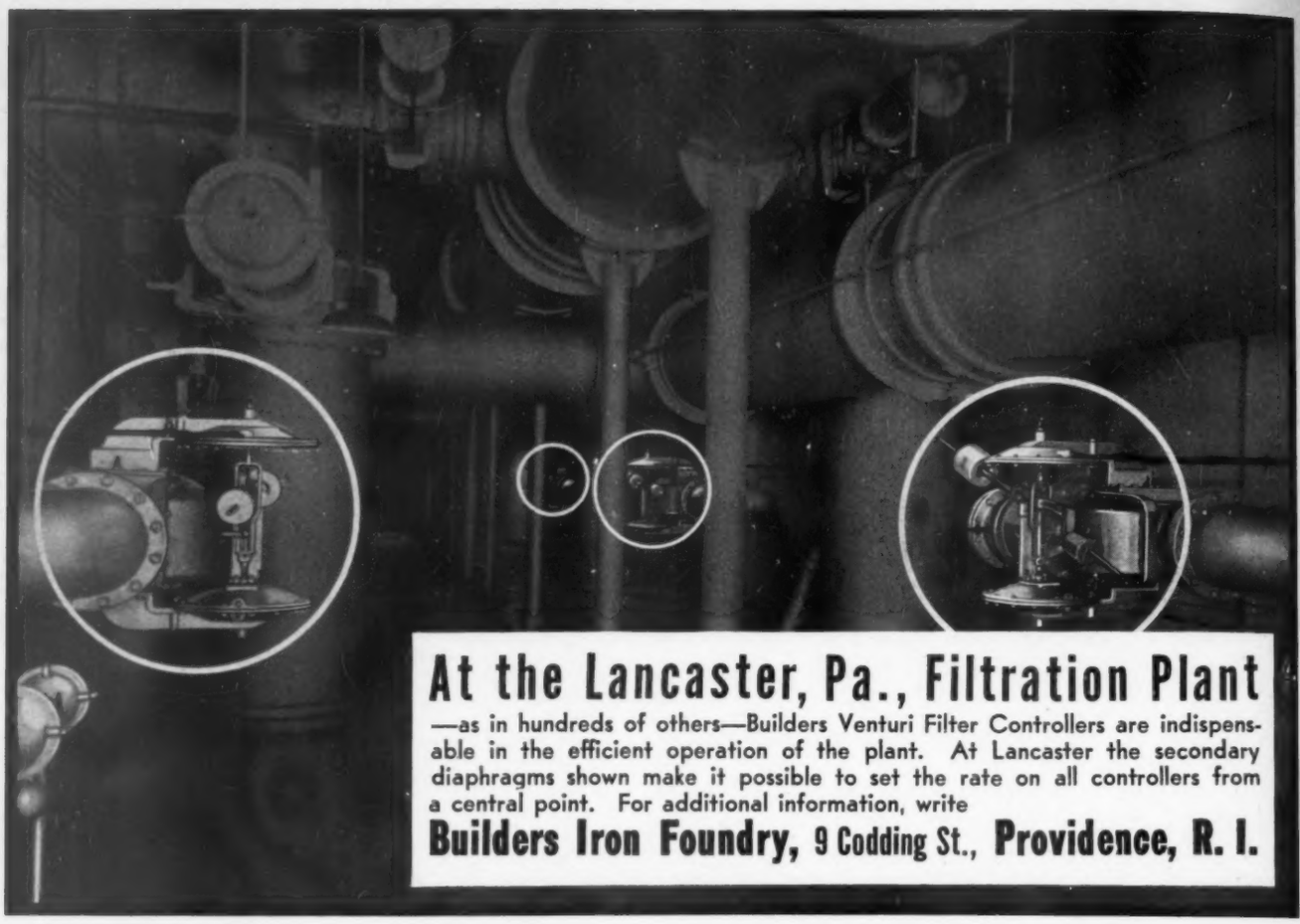
Sanitation Equipment Division,
CHAIN BELT COMPANY
1610 W. Bruce St., Milwaukee, Wis.
Please send me a copy of the Rex Triturator Catalog.

Firm Name.....

By (title).....

Street.....

City.....*State*.....



At the Lancaster, Pa., Filtration Plant

—as in hundreds of others—Builders Venturi Filter Controllers are indispensable in the efficient operation of the plant. At Lancaster the secondary diaphragms shown make it possible to set the rate on all controllers from a central point. For additional information, write

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Pomona builds Pumps . . . Deep Well Turbine Pumps in the full range . . . a size for every service wherever water is available. Two Pomona Pumps recently installed in a city water plant are believed to be the largest in the world. Put your pump problems up to an organization that knows pumps.

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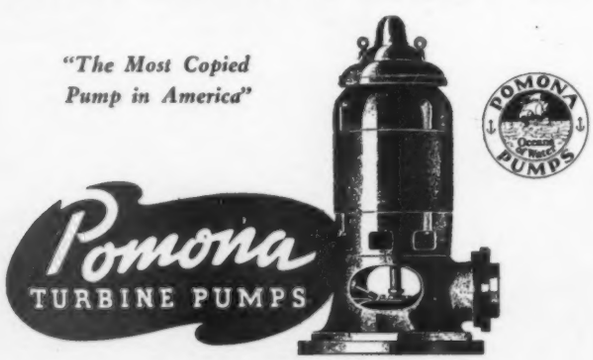

RITE-HITE

Patent No. 1,852,928

RITE-HITE Valve Box Tops are semi-steel one piece castings and are used for raising or lowering the height of old valve boxes without disturbing the paving.

Ask for descriptive folder

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TAPAX takes all the noise and danger out of loose manholes. It stops the noise and the complaint in one operation.

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NEW JERSEY ASSOCIATION OF PROFESSIONAL ENGINEERS

Devotes a Session to Water Works and Sewerage

AT ITS Annual Meeting in Jersey City, N. J., on January 14th and 15th, the New Jersey Association of Professional Engineers, made up of many classifications of professional engineers, devoted one full session to water supply and sewerage topics.

The program, arranged by the Chairman of the Water and Sewage Division—Fred S. Childs, Consulting Engr., and now State Director and Chief Engineer of the WPA in New Jersey—featured two all important questions in New Jersey, (a) *"Should a State Water Authority be Created in New Jersey?"* (b) *What has New Jersey Done in Regard to Curtailing Stream Pollution?*

Clyde Potts, Cons. Engr., New York (The Mayor of Morristown)

Arnold Frye, Atty., New York (Expert on Public Works Financing)

Potts and Frye on State Water Authority

Leading in this symposium was a well known consulting engineer, with many years of contact with legal and technical water supply problems in New Jersey and elsewhere—Clyde Potts, Consulting Engineer of New York City; likewise Mayor of Morristown, N. J., and long time engineer-member of New Jersey's Board of Health. Mr. Potts reviewed New Jersey experiences with developing large cooperative water supplies financed by individual municipalities jointly; pointed out the difficulties and near failure encountered by the most recent North Jersey Water Supply Commission project —the Wanaque Reservoir and Supply Mains—which a single city (Newark) prevented from happening by underwriting the financing. He felt that such projects were basically sound, and that future developments of major water supply would of necessity require undertakings of a cooperative nature between governmental subdivisions. However, the financing and central supervision would require means not now available or legal. It was Mr. Potts' conclusion, that under the present state organizations which have jurisdiction over water sources of the state, and the existing legal limitations, and lack of a financial method, that nothing could be accomplished of a substantial nature to make for satisfaction and success. He considered a new State agency to be essential—one with such broad authority as now existed in the N. Y. Port Authority, which was authorized to plan, finance, construct, and to fix rates following completion of its projects.

From Mr. Arnold Frye, an experienced attorney in matters pertaining to public works financing, came a splendid presentation discussing **"Legal Problems Involved in the Creation of a New Jersey State Water Authority—from a Practical Viewpoint."** Mr. Frye pointed to a first essential, the establishment of a well defined policy on the part of the State. Financing such large publicly owned projects might be so great a strain on the State as to necessitate turning to specific methods, through private sources, under the State's jurisdiction and guarantees. The State would thereby become a utility holding agency, necessitating the creation of a special authority, without power of taxation, and passage of covering legislation necessary thereto. With State guarantees behind the utility type revenue bonds issued, borrowed money would become available at rates less than those required in joint municipal borrowings. Like Mr. Potts, the speaker singled out the successful N. Y. Port Authority as an example, with its arrangement and rate fixing aspects an essential function of the now existing New Jersey Water Supply Authority suggested.

J. C. Remington, Jr., Camden, N. J., Consulting Engineer, added discussion to indicate what, along this line, had been done outside of the United States. He proposed that proper resolutions be drawn by the Association in the direction suggested by Messrs. Potts and Frye for forwarding to the Governor and legislators of New Jersey.

Fred S. Childs, The Chairman

W. S. Conlon, Exec. Sec'y, Nat'l Soc. Prof. Engrs.

Rudolfs and Enslow on Sewage Treatment

Two other papers presented in the program dealt with stream pollution abatement and sewage treatment.

"Elimination of Pollution of the Raritan, Elizabeth and Rahway Rivers"—by DR. WILLEM RUDOLFS, Chief, Division of Water and Sewage Research, New Brunswick, N. J.

Dr. Rudolf's paper, which is to be presented in full in a forthcoming issue of this magazine, was a timely

Dr. Willem Rudolfs, Chief, N. J. Sewage Expt'l Sta. (Proud of N. J. Progress in Sewage Treatment)

Louis P. Booz, City Engr., Perth Amboy, N. J. (First to Have Chemical Treatment in N. J.)

and eye-opening review of the accomplishments of the past 3 years in the construction of sewage treatment plants throughout the densely settled water-sheds of these three important, and heavily polluted, New Jersey rivers.

Dr. Rudolfs pointed out that there had been constructed 13 treatment plants on the Raritan, eight of which were chemical treatment plants of modern pattern. Four previously existing plants had been revamped and modernized in the program which had, interestingly, been developed and put into being based on popular opinion and the "people's wish" to secure PWA assistance and unemployment relief, along with cleaner streams. It was a case of cleaning up sewage pollution of a whole water-shed in one valley movement. The Elizabeth Valley project, on the other hand, had been fostered and engineered entirely by consulting engineers and municipal authorities. The Rahway Valley project went forward as the results of State Health Department pressure and orders. Thus, in three parallel valleys three different promotion methods had been utilized. The net result to date had been a 60 per cent reduced pollution loading of the three rivers in terms of oxygen demand values.

Dr. Rudolfs listed and presented pertinent data on the plants completed, and enumerated features of primary interest in each, likewise the relative costs on the per capita and per m.g. plant capacity basis. The Doctor closed with the statement that the next needed step on these rivers was that something be done toward curtailment of industrial pollution, which was equal to the domestic pollutions but remained unattacked to date.

Dr. Rudolfs' paper was discussed by C. J. VELZ, State PWA Engineer in charge of these newer projects, who presented an able analysis of the relationships between engineer, contractor and equipment manufacturers on sewerage projects, and made pertinent comments on the style and desired basic features of specifications. This contributor spoke some sound notes, based on experience in holding PWA projects to the line, but in a manner of reasonable latitude and fairness to the five major interests concerned—namely; federal, municipal, designing engineer, contractor, equipment manufacturer.

LOUIS P. BOOZ, City Engr., Perth Amboy, N. J., the second discussor, set forth some of the performance records of the Perth Amboy plant, called upon to handle industrial waste loadings not conceived possible with a less flexible process than chemical precipitation, followed by straining through magnetite filters. This first of the modern chemical plants in New Jersey could rest on its record of accomplishments, said Mr. Booz. Notable was the handling of 15 m.g.d. flow, with 2,000 p.p.m. suspended solids, when the plant had been designed to handle up to 10 m.g.d. only.

"Today's Aspects of Chlorination in Water Works and Sewerage Practices" were reviewed by LINN H. ENSLOW, who emphasized the recent developments involving the control of biological aftergrowths and consequent water quality degradation in water pipe systems, through "chlor-amination" to maintain tasteless residuals of chloramines all through the system; the newest use of "aero-chlorination" (air diffusion with dry chlorine gas added in minor fractions beyond the compressors) in materially boosting grease separation from domestic and industrial sewages; the use of chlorinated-iron in odor control and chemical precipitation. And closing by exhibiting lantern slides of typical and important installations, involving the modern uses of chlorine in water purification and sewage treatment.

MR. CLYDE POTTS, contributed an interesting sidelight, explaining one reason why chlorination of potable water, first applied at Boonton, N. J. (1908), was considered so important a measure at the time. It seems that Jersey City would have been forced to spend $2,000,000 had chlorination of its water supply not been successful and the, otherwise required, interceptor sewers and treatment works on the water shed been a necessity. The contractor on the project had gone broke; the banks had the unaccepted development on their hands; and the city had no more money. The romance in the story came out in the fierce court battles of the time, when chlorination won out as an acceptable process to save many lives since, and $2,000,000 at the moment.

A. E. GRIFFIN, Research and Development Division, Wallace & Tiernan Co., recited recent experiences in which chemical precipitation of sewage with "chlorinated-copperas" and alum had been found giving indifferent results until prechlorination of the crude sewage (up sewer) corrected the situation and reduced the chemicals required. While alum coagulation had been markedly improved, the most startling results had been observed with the iron coagulant. The same effect had earlier been observed in coagulating certain waters of high organic content, and of reducing nature. The up-sewer chlorination had also purged the sewer of much slime-like biological growth adhering to the walls.

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Crane's Sound Picture "Flow"

In a new sound picture entitled "Flow," just released by Crane Co., appear scenes of rivers in flood, thundering waterfalls and, then, primitive means of controlling flow. Then follows an educational tour through the Chicago works of Crane Co., where the various steps in valve manufacturing are revealed. It shows valves varying in size from towering giants to the smallest.

An absorbing scene shows one of the largest drop hammers in the country striking a block of white hot steel with the force of 8,300,000 foot pounds, shaping a big valve flange in the process. And the pouring of metal in the foundries offers another striking picture. Constant testing and research activities reveal that science serves to insure the maintenance of high quality standards. It is understood that arrangements can be made with Crane Co. to have this interesting and entertaining picture shown to a limited extent at sectional meetings of water works and sewerage associations. If interested, write the Publicity Department, Crane Co., 836 S. Michigan Ave., Chicago.

The Editor's Comments

A.W.W.A. Takes the Stride

CONCURRENT with the reorganization of the American Water Works Association, which got under way less than two years ago, the General Policy Committee and high officials of A.W.W.A. have publicly set forth certain important aims and proposed moves by the Association, to benefit its members, to benefit the Association, and to make it possible for a greater number of water works men to become members.

When we smelled the "smoke" of such men as Frank Barbour, Bill Hurlbut, Gene Dugger, as the three succeeding presidents since reorganization; or Harry Jordan, first as president, then as Chairman of the General Policy Committee, and the past year as Executive Secretary of A. W. W. A., we expected to see some "fire." Now, on January 19th, 1938, this "fire" has flared full. By the month's end A.W.W.A.'s Secretary had put into the mails, to every member, a copy of actions taken by the Board to open a new era in the history of A.W.W.A., now ready to take the proposals of the General Policy Committee in full stride.

We do not believe a better use for this page could be found than to present here the story unfolded within the Board's first meeting of the year, to be modified somewhat to meet all views, and then refolded with the stamp, "Approved, with Thanks!" The following are excerpts from the announcement which every member of A.W.W.A. has received from the Secretary's office with promptness of release which was blocked somewhat awaiting printing of the preliminary technical convention program and tour information folder, that a wasteful double mailing might be avoided.

We quote from Mr. Jordan's letter of January 31st—"To All Members." (The first page was devoted to a report on elections and awards, which are recounted elsewhere in this issue, and to a brief on committee activities and reports received. Then the following.—Ed.)

Junior Members and Affiliates

The Board approved *in principle* the addition of two new grades of membership in the A.W.W.A.; namely, Junior Member and Affiliate. In creating the new grades of Junior Member and Affiliate, it will not be possible for formal adoption of these grades to become effective at a date (by-law limitation) earlier than March 15, 1938.

However, the interest of Association members in the subject is so great that there is submitted herewith a paraphrase of portions of the General Policy Committee's report so that every member of the Association may be informed as to the general intent of the Board in the action that it took:

JUNIORS:

A Junior member shall be an employee of a municipal or private water works; a civil, mechanical, hydraulic, or sanitary engineer, a chemist, a bacteriologist, a student or any qualified person engaged or interested in the advancement of knowledge relating to water supplies. At the time of his admission he shall be not less than eighteen years of age. His connection with the Association shall cease when he becomes twenty-five years of age, unless he is regularly enrolled as a student in a university or has previously transferred to the grade of Active Member.

Juniors shall receive the *Journal* and receive all privileges of Active membership except holding office.

AFFILIATES:

1. Any person otherwise eligible to membership in the A.W.W.A., who has never been nor is at time of making application a member of the A.W.W.A. and who does not desire to apply for Active Membership in the Association, may apply for the grade of Affiliate.

2. The purpose of this grade of affiliation with the Association is to promote the acquaintance of men new to the field with the value of the A.W.W.A. services and to enable them to perform their work more efficiently.

3. No corporation, firm or partnership which otherwise would be entitled to the grades of Associate or Corporate member may hold the grade of Affiliate. No employee of an Associate member may become an Affiliate.

No person who is the Superintendent, the Manager, the Chief Engineer, the Superintendent of Filtration, the Chief Chemist or the Superintendent of Distribution, in a plant having more than 3,000 active services, is eligible for the grade of Affiliate.

4. No person who has previously been an Active member of the Association or who is an Active member at the time of applying for the Affiliate grade, may be enrolled as an Affiliate. Under unusual conditions, exception to the above may be made by action of the Executive Committee if the applicant sets forth fully the reasons for the exception when applying for the Affiliate grade.

5. Affiliates shall receive *four* issues* of the *Journal* per year.

6. Affiliates may hold Section offices except those of Chairman, Vice-Chairman, Secretary (and/or Treasurer) and Director.

7. Affiliates may attend annual conventions of the Association as well as Section meetings, and will be entitled to the registration privileges of Active members.

8. Dues for Affiliates shall be $4.00 per year, payable in advance.

9. Transfer to Active membership may be made upon written request from the Affiliate and his payment of Active member dues. Inasmuch as applications for admission as Affiliate will be subject to the same approval as are the grades of Active, Corporate and Associate member, the transfer from the Affiliate grade to Active membership need not be approved other than by the Secretary.

It is earnestly recommended that members, in considering the above, remember that the Board of Directors must at all times be mindful of the interests of two classes of persons—those who are now members of the A.W.W.A. and those who are not but should be. It is just as important that the interests and loyalty of the 3,100 persons already members of the organization be preserved as is the promotion of additional memberships of the Junior and Affiliate grades. In its desire to set the fee for Juniors and Affiliates low enough to serve their interests, the Board cannot penalize the many water works men who have already become members of the Association. The loyal cooperation of every member is earnestly solicited.

[The Association closed 1937 with the highest total number of members that it has ever had.]

Changes in the A.W.W.A. Constitution

The Board also approved, in principle, two changes in the constitution. The first will add a vice-president to the list of general officers. It appears useful to create such an office so that inability of a president to serve may not interrupt the routine of Association affairs. The second change will add to the qualifications for selection of Section Directors the requirement that they reside within the territory of the Section they represent.

Each of these changes must be approved in exact phraseology by the Board, submitted to all members prior to the convention, approved in a business meeting during the convention and finally approved by an all-member letter ballot after the convention.

Publicity for Water Works Men

The Board approved a one year program of publicity on behalf of water works operators. A series of articles, phrased for newspaper use, will be prepared for distribution to 2,000 editors over the country. This work will be done by a professional publicity man who has a fine record of past performance on behalf of several country-wide organizations. The articles will be designed to bring to the readers' attention the value of water works service to a community, the value of experience in water works operation and the need for community recognition and support of efficient service by water works employees.

The Water Works Manufacturers Association has gratuitously offered to cooperate in financial support of this campaign. The first of the series of "clip-sheets" will go forward early in February. Any *member* who wishes to give us the name of a newspaper editor to add to the list should send it to this office at once. Every effort possible will be made to promote the interests of the Association's present and potential membership and *suggestions from the field will be welcomed.* [Italics ours.—Ed.]

The Board approved a petition, signed by every A.W.W.A. member resident in the State, for the formation of a Michigan Section. With the full cooperation of the Central States Section, from which the Michigan group will be detached, an organization committee has been at work for several months. Already there is definite evidence that a rapid increase in membership will occur as the new Section gets under way.

Through the diligence of Mr. L. H. Enslow, chairman of the Publication Committee, and with the cooperation of Division chairmen and Association members, it is possible to include in this circular a tentative program† for the New Orleans meeting.

General planning of the convention is in the hands of "Bill" Orchard. Entertainment is being arrangegd by "Clint" Inglee, transportation assigned to John Warde, golf to Karl Mann, and publicity to Charlie Eastwood.

Yours for our best convention and the most successful year in A.W.W.A.

Cordially,

HARRY E. JORDAN, *Secretary.*

It is to be noted that the Association starts a much needed program of publicity to benefit water works men, with the intent of spending its available funds in behalf of *members* first. We have heard the complaint that A.W.W.A. has little to offer its members outside of technical advantages—principally its Journal. Here, now, is evidence that other tangibles, and more to come, are to be offered. The success of the publicity move and its continuance will depend upon members who are being requested to send in editors' names and news items concerning their systems. We have emphasized by the italics used in the Secretary's letter that—*"Suggestions from the field will be welcomed."* It is well to remind water works men that a light kept hidden never shines; that the best advertising man must have ideas presented by the client before he can prepare "Copy" that will ring the bell.

Such developments as those above recorded, as selected portions of the Secretary's report to the membership, must be heralded as genuine attainments and, we predict, marks the beginning of "the new day." A.W.W.A.'s officers have made good their promise; it is now the members and members to be who must put a shoulder to the wheel, to keep the wagon rolling.

*[Issues expanded to meet the interests of men in the smaller communities.—Ed.]

†[Presented on other pages of this issue.—Ed.]

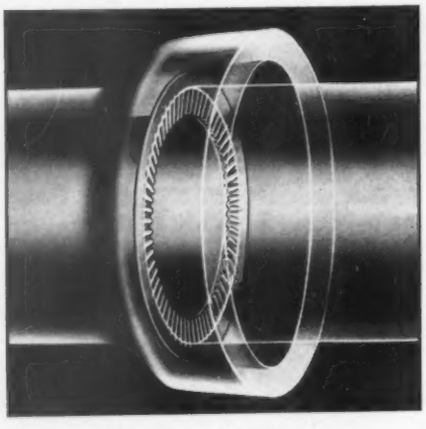
EQUIPMENT NEWS

Root Free Sewers Guaranteed

"Root-free sewers guaranteed!" constitutes a statement of large order. Contingent on bott'e-tight jointing the guarantee would sound a reasonably expected one. But, when the guarantee also extends to weeping or sweating (even leaking) joints, such a guarantee becomes NEWS; and especially so since it is backed by a policy issued by a dependable 70-year-old insurance company.

A. B. C. Manufacturing Co. of Quincy, Ill., may become as reputed for its conservancy policy as have New Englanders of the old school. Three years ago we heard of their interesting copper "Stop-Root" rings but, without ample proof of their effectiveness with time, "A. B. C." wished to find the "X. Y. Z." of these root-poisoning rings before they would let us tell our readers about them.

Since that time these rings have been put through exhaustive and exacting tests at the University of Illinois experimental station under the direction of Professor H. E. Babbitt. Based on the results and report rendered, A. B. C. has gotten the unusual insurance company backing and is now ready to market "root-rings" (U. S. Pat. 1,968,734) and stand on their reliability, pay the costs of cleaning and replacing root-stopped sewers if roots pass the copper protected joints—leaky or not.



Copper "Stop-Root" Rings

The above phantom sketch pictures the light weight, pure soft-copper gasket, with slight overlap ends to give a spring set and make easy its slipping into the bell without special equipment. Shoving the spigot end home does the rest, and *any* method of jointing preferred may be employed to complete the joint.

The explanation of root stopping is simple to any agricultural chemist or botanist who has long since learned that copper salts are deadly to tender feeder roots; also that soils bearing weathering copper compounds are usually barren soils. Stoppage of feeder roots means *prevention* of root entry. The traces of copper salts formed from moisture, ground or sewage salts and carbon dioxide, produce a protective copper "patina" (green copper roofs have it) which spells destruction to tender feeder roots, fungi and even bacteria. That is apparently the explanation of the conclusive results of the tests and demonstrations of A. B. C.'s ability to guarantee even imperfect joints against root entry. These rings are available through any sewer pipe manufacturer or sewer contractor.

For detailed literature or a copy of the University of Illinois report, and the startling guarantee on water, irrigation or sewer lines, write A. B. C. Manufacturing Co., Dept. (WS), 221-23 S. Fourth St., Quincy, Ill.

▼

New High-Speed Concrete Vibrator

The Syntron Co., Homer City, Pa., have just put on the market a new Electric Motor-Driven, Internal type of Concrete Vibrator to vibrate concrete into place as it is poured.

New Syntron Concrete Vibrator

The advantages of vibrating concrete at high speeds, to increase its density, and permanence, need not be repeated here. The equipment consists of three pieces: an electric drive motor, mounted on two small wheels; a variable length of flexible shafting; and the vibrating tool, which is immersed in the concrete. In operation, 7,200 vibrations per minute are delivered by the vibrating tool.

The electric motor, which is mounted on small steel wheels as illustrated, is of the repulsion-induction type and operates on both 110-220 volts, single phase, A.C. It has a built-in gear box with quite, molded gears that increases the driving speed to 7,200 RPM.

The flexible shafts are metal armored and are available in 7 ft. and 12 ft. lengths that can be coupled together to make up to a maximum length of 31 ft.

The vibrating tool is available in two sizes—1⅝ and 2⅝ in. diameter and it consists of a steel cylinder, inside of which is an out-of-balance shaft rotating at high speed in heavy ball bearings, which sets up the terrific vibration that permeates the mass in all directions at the rate of 7,200 vibrations each minute.

For complete detailed catalog write Syntron Co., 650 Lexington Ave., Homer City, Pa.

▼

"Flextite" for Plugging Wall Leaks

"Flextite" is a waterproofing liquid for mixing with Portland cement to produce a rapid set "putty" for plugging water or sewage leaks through walls, conduits, pipelines, etc., under pressure heads. To produce a waterproofing plaster, "Flextite" is added to the water used in making cement-sand mortar (1 part cement, 2 parts sand and 10 to 15 parts of water containing 1 part "Flextite") to be applied thinly over the wetted surface. To produce the cement-putty for leak plugging, undiluted "Flextite" is rapidly kneaded into small batches of raw Portland cement with the use of rubber gloves. Rolling a carrot-shaped plug quickly and plugging it into the leak, held for only 30 seconds against the pressure, results in a very hard set which stops the leak permanently. It may also be used for stopping gas leaks around sewage plants.

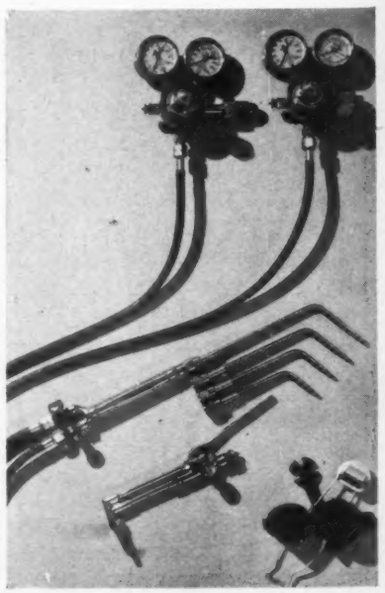
For descriptive literature and a trial shipment, offered on satisfaction guarantee and return basis, write Flexrock Co., 800 N. Delaware Ave., Philadelphia, Pa.

▼

Victor's New Welding-Cutting Unit

For the shop or in the field, or wherever an efficient light-weight combination cutting and welding unit is of advantage, Victor Equipment Co., of San Francisco is now offering a new unit.

It is comprised of a new Victor welding torch of proven design but of slightly smaller size, equipped with four nozzles.



New Welding-Cutting Unit

Each nozzle is provided with its individual Victor patented "Spiral Mixer." An efficient cutting attachment, with tip, instantly fits onto the welding-torch head.

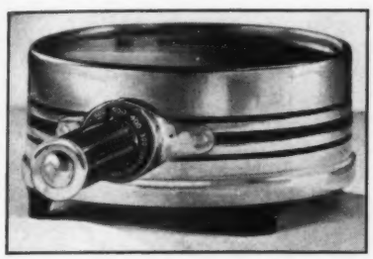
New type "SVJ" double-gauge regulators of adequate capacity and excellent pressure accuracy, together with oxygen and fuel gas hose, goggles, spark lighter and necessary wrench, complete this compact efficient unit. The unit so supplied offers a welding range from very light sheet-metal to beyond ¼ inch of metal thickness, and permits easy cutting of metal thickness up to 3 inches.

For more information ask for literature descriptive of Victor Combination Unit No. SV-100. Address, Victor Equipment Co., 515 Harrison St., San Francisco, Calif.

▼

Inexpensive Hot Plate

The neat little utility hot plate (4 in. diam.) illustrated here is being offered by Wilkins-Anderson Co., laboratory supply house of Chicago, at a moderate price—less than the cost of a quart of a certain liquid considered good for diluting with fizz-water. It is thermostatically con-



New Utility Plate

trolled; is sturdily built, with embedded 750-watt element; is chromium plated and attractively striped; has a graduated heat-setting insulated handle, and comes complete with cord and plug. For details and the "Waco" catalog, write Wilkins-Anderson Co., 111 N. Canal St., Chicago, Ill.

▼

WITH THE MANUFACTURERS

L. W. Wallace (Dr. Eng.) Heads Cranes Eng. & Research Div.

Crane Co., by establishing a new Division of Engineering and Research, has combined all of its engineering and research activities. As head of the new division Dr. L. W. Wallace has been secured as Crane's new Director of Engineering and Research.

Dr. Wallace

The activities of the new division, with its new and enlarged laboratories, will include—development of new products and equipment, inventions and patents, improvements in design and maintenance of existing Crane products.

Dr. Wallace in 1912 received the degree of Mechanical Engineer from Purdue University, which he thereafter served as professor of mechanical engineering and industrial management. In 1932 Purdue conferred on him the honorary degree, Doctor of Engineering. Dr. Wallace goes to Crane Co. from the Association of American Railroads, which he has been serving as Director of Engineering Research. For thirteen years he was Executive Secretary of the American Engineering Council. At one time he was general manager, in charge of production, for an important manufacturing company; also, vice-president of an engineering corporation. For his services to foreign governments he has been decorated.

Dr. Wallace is vice-president of the American Society of Mechanical Engineers and has just accepted an invitation to address the 1938 Convention of the American Water Works Association on "The Meaning of Research."

▼

Oliver Celebrates 30 Years of Filtration

Oliver-United Filters, Inc., which claims distinction as "the world's largest manufacturers of vacuum filters," recently celebrated its thirty years in the filtration business. The occasion was a supper-dance held in Oakland, Calif., at which most of the company's 400 employes were present. From the East came representatives from the Chicago and New York sales office, and the factory at Hazelton, Pa. Mr. E. L. Oliver, president and general manager, spoke, as did Mr. E. J. Sweetland, chairman of the board and former president of United Filters Corp. before the 1928 merger with Oliver Filters.

The voice of "Oliver-United"—What, with the "Fordized" ready-to-serve units, for the small plants, now in production—30 years is *just the beginning, folks!*

▼

R. A. Arvesen Joins Hill, Hubbell & Co. as Sales Engineer

Hill, Hubbell & Company, Division of General Paint Corporation, Cleveland, Ohio, announces the addition of Mr. Ralph A. Arvesen to its sales engineering staff.

R. A. Arvesen

After attending Northwestern University, where he majored in Civil Engineering and Hydraulics, Mr. Arvesen has had several years of practical experience in the utility field on construction and maintenance work on Hill-Hubbell protected steel pipe.

The growing demand for steel pipe in water works construction is calling for increased personal contact with its users, and for this activity Mr. Arvesen is unusually well qualified. He will cover the Northeastern and the Atlantic States, including Virginia.

COPPERAS
(FERROUS SULPHATE)
· · · FOR WATER & SEWAGE TREATMENT
(The Base For Chlorinated Copperas)

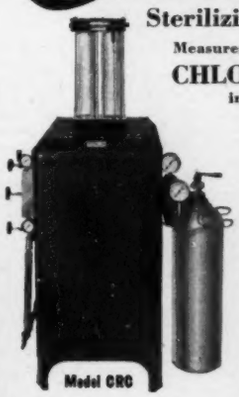
KILLING ROOTS IN SEWERS WITH COPPER SULPHATE

Root troubles in sewers can be eliminated by the use of Copper Sulphate. Cities and towns have used copper sulphate for this purpose for several years. By throwing the copper sulphate crystals into choked sewers, while at least some sewage is still flowing, a sufficient concentration of the poison kills the "feeder" stem and the root mass breaks the dead stem which has lost its toughness. Down the sewer go the root balls to its outlet.

WE INVITE YOUR INQUIRIES

FAESY & BESTHOFF, INC.
22 E. 40th St. New York

Everson
Sterilizing Apparatus
Measures—Mixes—Feeds
CHLORINE GAS
in solution



Unsurpassed for sterilizing Drinking Water, Sewerage Plants, Swimming Pools.

A Complete line embodying the new EVERSON Rota-Meter Gas Flow Control that introduces a new degree of Accuracy. Dependability, Ease of Control, Safety and astonishingly low prices.

Capacity ratios of from 1 to 10 between maximum and minimum Finger-tip control. Write for illustrated Bulletin.

EVERSON MFG. CO.
233 W. Huron St., Chicago, U. S. A.

Astonishing NEW EVERSON development the Rota Relay . . . provides 1 to 40 capacity ratio equipment for applications requiring extremely wide range of gas delivery.

"I'll see you in NEW ORLEANS!"

All over the country water works men are talking about this year's convention to be held at New Orleans at the Hotel Roosevelt, April 24 to 28, which promises to be "America's Greatest Water Works Convention."

Why not make every possible effort to attend this meeting in the "heart of the old South" to renew old friendships and to make new ones?

The Activated Alum Corporation extends to you a cordial invitation as a manufacturer of water works products and hopes that you can find time while at the meeting to stop by their display and see why

In BATAVIA, NEW YORK, its Activated Alum Corp.
In CUMBERLAND, MARYLAND, its Activated Alum Corp.
In EAST LIVERPOOL, OHIO, its Activated Alum Corp.
In FORT MEYERS, FLORIDA, its Activated Alum Corp.
In GREENSBORO, NORTH CAROLINA, its Activated Alum Corp.
In HAGERSTOWN, MARYLAND, its Activated Alum Corp.
In HAMILTON, OHIO, its Activated Alum Corp.
In LAUREL, MARYLAND, its Activated Alum Corp.
In NEWBURG, NEW YORK, its Activated Alum Corp.
In NEWPORT NEWS, VIRGINIA, its Activated Alum Corp.
In ONEONTA, NEW YORK, its Activated Alum Corp.
In PETERSBURG, VIRGINIA, its Activated Alum Corp.
In ST. AUGUSTINE, FLORIDA, its Activated Alum Corp.
In SARASOTA, FLORIDA, its Activated Alum Corp.
In TRENTON, NEW JERSEY, its Activated Alum Corp.
In VILLA GROVE, ILLINOIS, its Activated Alum Corp.
In WELDON, NORTH CAROLINA, its Activated Alum Corp.
In WILMINGTON, NORTH CAROLINA, its Activated Alum Corp.
In YOUNGSTOWN, OHIO, its Activated Alum Corp.
In FREDERICKSBURG, VIRGINIA, its Activated Alum Corp.
In SOUTHERN PINES, NORTH CAROLINA, its Activated Alum Corp.

A Representative List of Users

We have recently issued a new publication by Burton W. Graham—"WHAT IS NEW IN COAGULATION?" Copy will be gladly sent to you upon request.

PRODUCTS
1. Activated Alum
2. Blackalum
3. Regular Alum
Details and samples gladly sent upon request.

"When you think of Alum, think of Activated."

AN INDEPENDENT ALUM COMPANY

Activated Alum Corp.

Office
80 Broad Street
New York City, N. Y.

Works
Curtis Bay
Baltimore, Md.

MEETINGS SCHEDULED:

Feb. 17—BOSTON, MASS. (Hotel Statler).
New England Water Works Association. (Monthly Meeting). Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

Mar. 10-11—TRENTON, N. J. (Stacy-Trent Hotel).
New Jersey Sewage Works Association. Sec'y, John R. Downes, Bound Brook, N. J.

Mar. 14-18—RALEIGH, N. C. (N. C. State College).
N. C. State College Annual Water Works School. D. S. Abell, Principal Assistant Engr., State Board of Health, Raleigh, N. C.

Mar. 17-18—JAMESTOWN, N. Y. (Hotel Jamestown).
New York Section A.W.W.A. Sec'y, R. K. Blanchard, 50 West 50th St., New York City.

Mar. 21-23—LOUISVILLE, KY. (Brown Hotel).
Kentucky-Tenn. Section A.W.W.A. Sec'y, H. D. Schmidt, State Dept. Health, Nashville, Tenn.

Mar. 23-25—WINDSOR, ONTARIO (Prince Edward Hotel).
Canadian Section A.W.W.A. (Annual Meeting). Sec'y-Treas., A. E. Berry, Ontario Dept. Health, Parliament Bldgs., Toronto, Ont.

Mar. 24-26—LAWRENCE, KANS. (University of Kansas).
Kansas Water & Sewage Works Association. Sec'y-Treas., Earnest Boyce, Chief Engr., State Dept. of Health, Lawrence, Kans. (Preceding the Association meeting the Annual Water & Sewage Short School is scheduled at the University for March 21, 22 and 23rd.)

Mar. 30-Apr. 1—EAST LANSING, MICH. (Michigan State College).
Michigan Sewage Works Operators' Conference. Sec'y, W. F. Shephard, Asst. Engr., State Dept. of Health, Lansing, Mich. (Preceding the Conference the Annual Short Course for Sewage Works Opertaors will be held at Michigan State College, March 28, 29 and 30.)

Apr. 5-6—DECATUR, ILL. (Orlando Hotel).
Illinois Section A.W.W.A. Sec'y, Mr. Winfred D. Gerber, P. O. Box 232, Urbana, Ill.

Apr. 7-8—LAFAYETTE, IND. (Purdue University).
Indiana Section A.W.W.A. (Annual Meeting). Sec'y-Treas., John A. Bruhn, Indianapolis Water Co., 113 Monument Circle, Indianapolis, Ind.

Apr. 11-13—FAYETTEVILLE, ARK. (University of Arkansas).
Arkansas Water and Sewage Works Conference. Sec'y, Harrison Hale, University of Arkansas, Fayetteville, Ark.

Apr. 24-28—NEW ORLEANS, LA. (Hotel Roosevelt).
American Water Works Association (Annual Convention). Executive-Secretary, H. E. Jordan, 29 West 39th St., New York City, N. Y.

April 14—BRISTOL, CONN. (New Departure Inn).
New England Water Works Association (Spring Meeting). Sec'y, Frank J. Gifford, 613 Statler Bldg., Boston, Mass.

May 9—DANBURY, CONN. (Hotel Green).
New England Sewage Works Association. (Spring Meeting). Sec'y, F. W. Gilcreas, State Dept. of Health, Albany, N. Y.

May 11-12—BOZEMAN, MONT. (State College).
Montana School for Water Works Operators. Sec'y-Treas., H. B. Foote, Director, Div. of Water and Sewage, State Board of Health, Helena, Mont.

May 13-14—BOZEMAN, MONT. (Baxter Hotel).
Montana Section A.W.W.A. Sec'y, H. B. Foote, State Board of Health, Helena, Mont.

May 19-20—BALTIMORE, MD. (Hotel Emerson).
Maryland-Delaware Water & Sewage Works Assn. Sec'y, A. W. Blohm, Asst. Engr., State Dept. of Health, Baltimore, Md.

May 19-21—SPOKANE, WASH. (Hotel Davenport).
Pacific Northwest Section A.W.W.A. Sec'y, Fred Merryfield, Oregon State College, Corvallis, Ore.

May 23-25—DAYTONA BEACH, FLA. (Hotel not announced).
Florida Section A.W.W.A. Sec'y, J. R. Hoy, 404 Hildebrandt Bldg., Jacksonville, Fla.

May 25—NEW MILFORD, N. J. (Hackensack Water Co. Plant).
New Jersey Section A.W.W.A. Sec'y, Prof. H. N. Lendall, College of Engineering, Rutgers University, New Brunswick, N. J.

CATALOGS AND LITERATURE RECEIVED

[Any of the publications reviewed in this section can be secured from or through Water Works and Sewerage, if such be desirable.]

"Water Works Supplies"—Are presented in a new and distinctive catalog just produced by the Farnan Brass Works Co. of Cleveland. By way of an introduction one learns, with interest, that this 85 year old business, founded in 1852 by James Farnan, has passed down through four generations to the existing president and general manager, Louis P. Smith, who is a great-grandson of the founder. Then another item of unusual interest is the reproduction of the time-worn original Associate Membership Certificate in the American Water Works Association, dated April, 1892. Also, a letter from A.W.W.A. headquarters identifying Farnan Brass Works as one of its oldest associate member firms. If "Life Begins at 40," then Farnan Brass Works Co., has begun its third rejuvenation.

So much for the aside remarks; now to the review of this distinctive Farnan Catalog. It is startingly bound between substantial rippled-bronze covers bearing an escutcheon in brass, to indicate the materials of which are made the items requiring 95 pages of detailed picturization and description, to bring them to the eyes of the user. The operator, manager or engineer with sparse effort can find his needs amongst the thousands of items listed. Starting at "Accessories" and on through "Corporation-Cocks," "Caulking Tools," "Copper Tubing," "Fittings," "Stops and Drains," "Unions," "Valve Boxes," "Y Branches," and on to "Yarning Irons"—is only to glance through the pages with a hop and a skip. It would be an interesting feature at their A.W.W.A. Convention exhibit-booth, in New Orleans, if Farnan Brass Works ran a prize guessing contest—"How many items are pictured in this catalog?" Certainly no one would ever find time to count them all. "What is that fitting called?"—If in doubt, look it up in this new Farnan "Encyclopedia of Fittings." If you haven't received a copy for permanent reference, by all means write for Catalog 136. The Farnan Brass Works Co., Cleveland, O., is sufficient address to reach them.

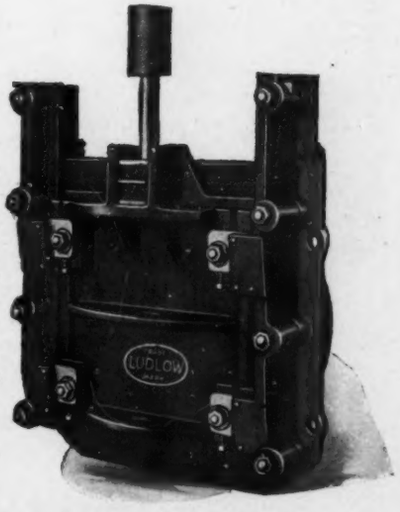
"Duronze"—Is Bridgeport Brass Co.'s trade-name for this firm's new corrosion resistant high strength, silicon bronzes. The 80-page "Duronze Manual," just published, is of particular interest to designing engineers and equipment manufacturers, as well as to water and sewage works managers.

"What is Duronze?"—is the question clearly answered in the first chapter. Thereafter, the specific properties and characteristics of "Duronze" I, II, III and IV are set forth. Thus is introduced these "designed" alloys, of which there is one if not two best suited for the specific duties called upon to perform. With corrosion and

This Ludlow sluice gate installation is typical of the type being adopted in many municipalities. Sewerage and filtration jobs call for rugged, simple, reliable gates and valves—just the type where Ludlow's 60 years of experience is most valuable. Be sure to get a Ludlow estimate on your next job.

IMPROVED TYPE NOW OUT

The Ludlow sluice gate shown at right has adjustable wedges at sides, top and bottom, depending on size and pressure. It can be furnished for circular, square or rectangular openings, in rising and non-rising types and with various types of operating controls.



Ludlow representatives in all principal cities.

The LUDLOW VALVE MFG. CO.
TROY, NEW YORK

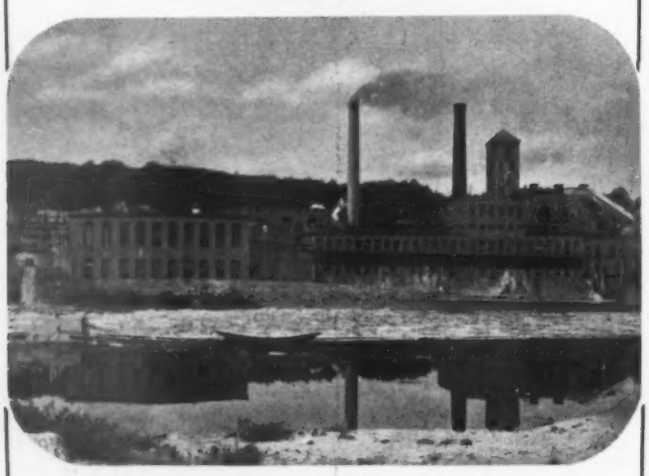
HIGH SALVAGE VALUE

Photo shows Cast Iron tee and an outlet flange of a substitute material uncovered during the current rebuilding of the Greenville, Miss., pumping plant. The faithful old Cast Iron tee is in perfect condition after 41 years' continuous use and is being re-installed for many more years of dependable service; the outlet composed of a substitute for Cast Iron Pipe is being scrapped. For literature on high-quality Cast Iron Pipe and Fittings, address Acipco office nearest you.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM, ALA.

SPARLING MAIN-LINE METERS IN PAPER MILLS



International Paper Company's Otis Mill at Livermore Falls, Maine, uses 15,000,000 gallons of water daily. Sparling Meters measure the ground wood and sulphite "stock" as well as the "white water." Fourteen Sparling Meters, from four inch to twenty-four inch, are used in International Mills. Hundreds of other industrial plants, besides municipal water works and sewage disposal plants are equipped with Sparling Meters, Rate Indicators and Recorders. Write us for information on your main-line metering requirements.

P. W. SPARLING

WATER MEASURING EQUIPMENT

945 North Main St. Los Angeles, California

CHICAGO 3104 S. Michigan Ave. | CINCINNATI 622 Broadway | NEW YORK 101 Park Ave.

fatigue resistance of fine bronzes, but strength double that of copper, are the basic claims for "Duronze," which is subject to welding and possesses the strength and toughness of mild steel. Bolts from No. I average 100,000 lbs./sq. in. tensile strength; and so on goes the distinctive features of the four grades. Many typical applications (Boulder Dam, Water Works, et al.), are illustrated, and tables and graphs assist the reader to compare "Duronze" alloys with other structural metals and alloys. In the rear appears "Engineering Data," which show at a glance what "Duronze" best serves under defined conditions, in various corrosive solutions or atmospheres. "Methods of Machining"; "Methods of Sheet Welding," (both in detail); "Weight Tables" (for wire, sheets, rods); completes the story in Bridgeport's first "Duronze Manual." And, now another useful bronze alloy has become available to the engineer and fabricator. For a copy of the easy to follow "Duronze Manual," write Bridgeport Brass Co. (Dept. W.S.) Bridgeport, Conn.

"What's New in Coagulation?"—Is the question answered in a 16-page booklet, just off the press, which comes from Activated Alum Corp. The context is a reproduction of a rather thorough review of important developments in coagulation and coagulants by Burton W. Graham, Activated Alum's chief chemist. It is in fact a reproduction of the masterly paper presented by the author before the Virginia Section of A.W.W.A. It covers fundamentals, theory vs. practical applications of coagulants, necessary steps in coagulation, a condensed review of the literature (plus a useful bibliography), summary of major developments, and "what's new" in the way of modern coagulants and their applications. Now in the developmental stages, applications of such coagulant aids as silicates, bentonite, other adsorptive clays, the powerful titanium salts, activated carbon, et al., are briefly set forth, and their possibilities discussed when compounded with old-line alum and iron salts to produce modern coagulants, such as Standard Activated Alum and Black Alum produced by the author's company. Worthy as a reference work, useful as a "What's new" contribution, "What's New in Coagulation" is worth requesting. Address Activated Alum Corp., Curtis Bay, Baltimore, Md., or 80 Broad St., New York City.

"Concrete Pipe Structures"—From the American Concrete Pipe Association has been received a richly leather bound hand-book, prepared and edited by M. W. Loving, Engr. and Sec'y of the Association. The foreword reveals that much of the context of the special bulletin "has been drawn from writings of, or correspondence and interviews with, engineers responsible today for the practical design and construction of drains, culverts and sewers." Contained are recommended methods of bedding and backfilling pipe lines in trench and joint making. Construction of pipe lines by the newer jacking methods, and in tunnel, is described in detail—based on practical experience in design and construction. Extensively illustrated, the text becomes materially simplified, and more meaningful and interesting. Standard specifications for all forms of concrete

pipe are reproduced, and many useful engineering and hydraulic flow graphs and tables appear. It is not clear that this handbook (Bul. No. 16) is available for unrestricted distribution, but it is well worth the inquiry. Address M. W. Loving, Secretary, the American Concrete Pipe Association, 33 W. Grand Ave., Chicago, Ill.

"Everson Equipment"—Is presented in a new and complete catalog covering pressure filters, chlorinators, and other accessories for water treatment and swimming pools. Considerable space is devoted to "Everson Safety Electric (Hypochlorite Generating) Sterilizers" and the "Everson Rota-Meter Chlorine (Gas) Control Apparatus." Interesting, also, are the "Everson Portable Self-Priming Centrifugal Pumps," of tool-box proportions, available in close connected motor or gasoline-engine models. Much space, too, is devoted to swimming pool equipment, in complete assortment. For the "Everson 1938 Catalog," write Everson Mfg. Co., 214 W. Huron St., Chicago.

"Anybody Need a Rock Drill or Paving Breaker?"—If so, there's lots of this sort of equipment to look over in the new 80-page Catalog by Ingersoll-Rand. In keeping with the usual style and "finish" of I-R productions, the new catalog is splendidly illustrated on excellent stock, and presents the full I-R line of rock-drills, paving breakers, jack-hammers, drills, bits, sharpeners, core drills, diamond drills, accessories. At the close of this "encyclopedia of drills" comes a "Data Section" of tables and formulae, useful in connection with air compression and air transmission through pipes and hose lines. For "Rock Drills," Cat. No. 4201, write Ingersoll-Rand, No. 11 Broadway, New York City, N. Y.

"For Electrolysis Surveys"—A new bulletin describing "Bristol's Recording Millivoltmeter for Electrolysis Surveys," has come from The Bristol Company It contains illustrations and complete descriptive information regarding these instruments, their sensitivity to conform with the application, and their ruggedness for withstanding rough use and transportation without special handling precautions. Bristol's Electrolysis Recorders, already widely used in electrolysis surveys, are stated to give continuous permanent records of electrical values in the most convenient form for study and analysis. For Bulletin No. 480 write The Bristol Co., Waterbury, Conn.

"New Boiler Feed Pump" — From Fairbanks, Morse & Co. comes a bulletin announcing the improved "F-M Duplex Steam Pump" built with an eight-cover (side-pot type) fluid end, for ease in servicing, and improved pistol valve steam end, for economy in operation. The new pump has been developed particularly for high pressure boiler feed-water duty, but is well suited for other high head pumping, up to 148 g.p.m. and against heads to 1,000 lbs./sq. in. No part of the piston-rod enters both the fluid and the steam end stuffing-boxes because of the long cradle between, also making for ease in servicing the stuffing boxes, as do the individual valve-pots (with individual covers) in servicing the fluid end. The new pump is available for electric motor or fuel engine drive in addition to steam drive. For Bul. 6285 "F. M. Duplex Pumps," write Fairbanks, Morse & Co., 900 So. Wabash, Chicago.

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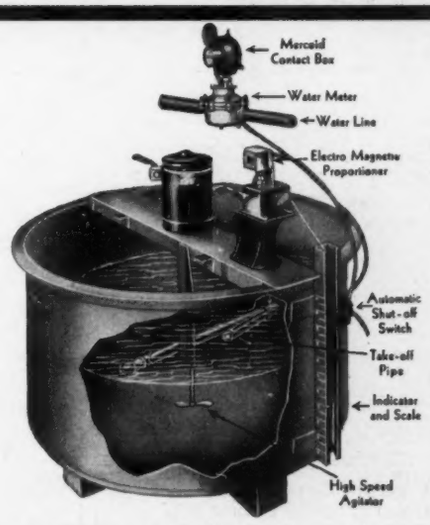

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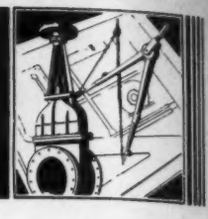

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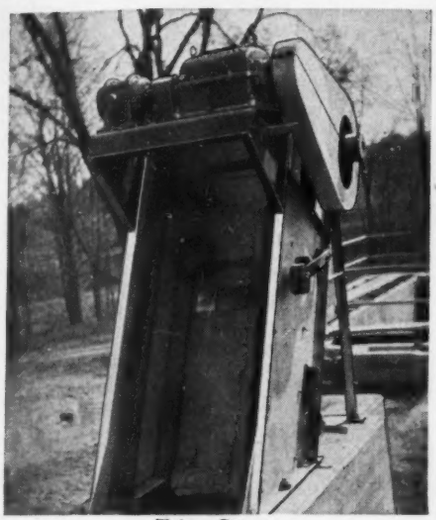

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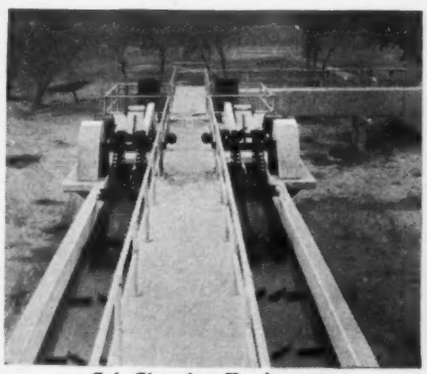

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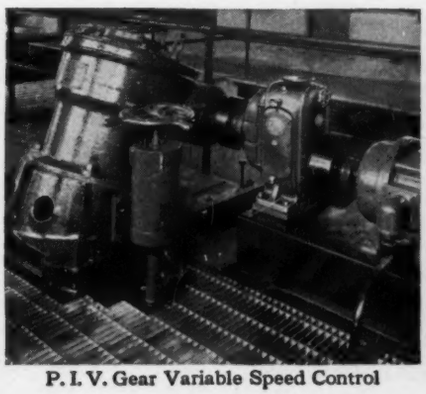

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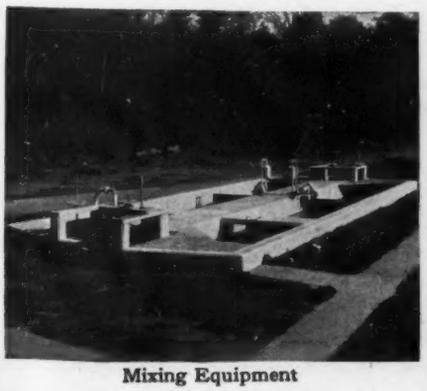

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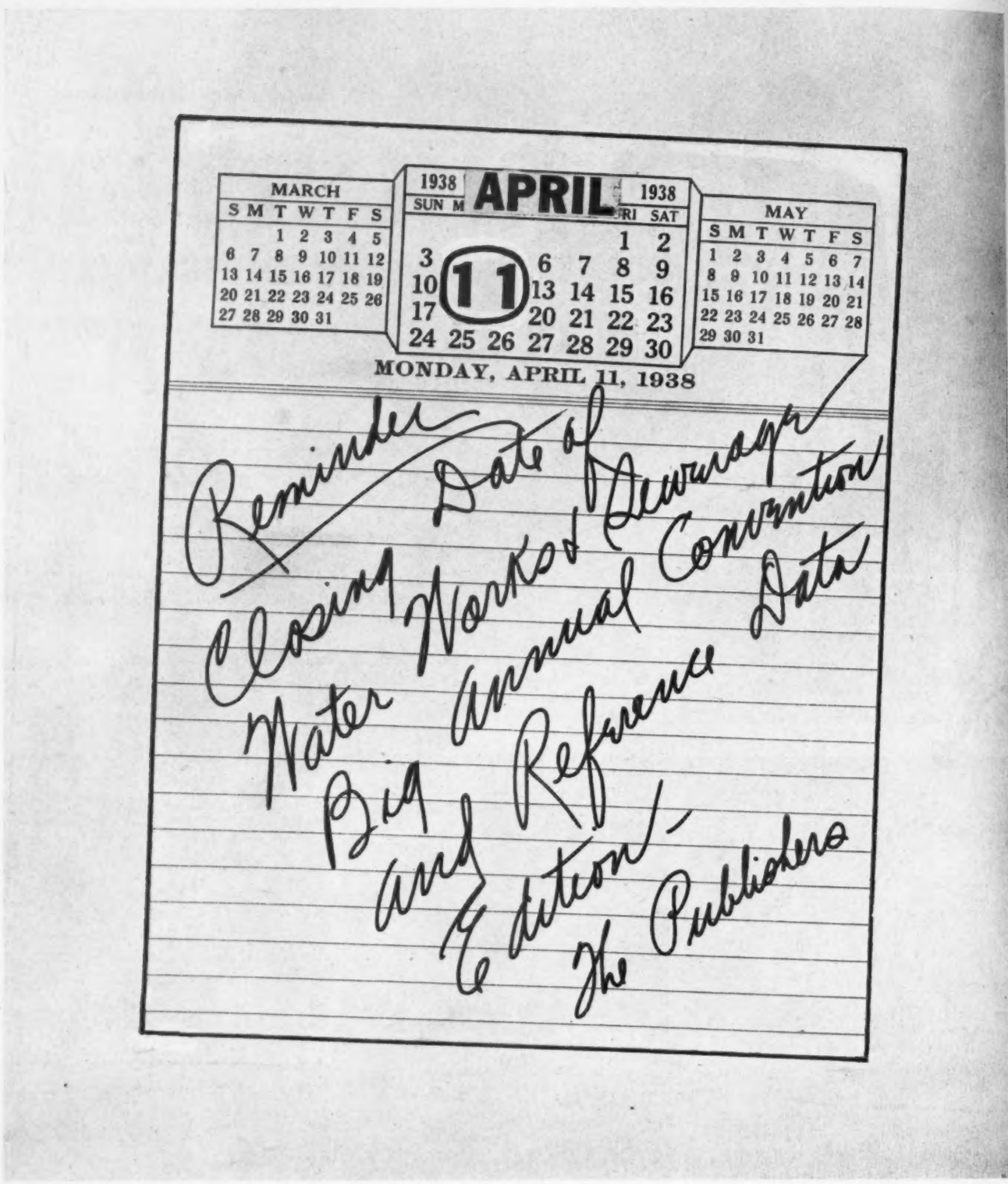

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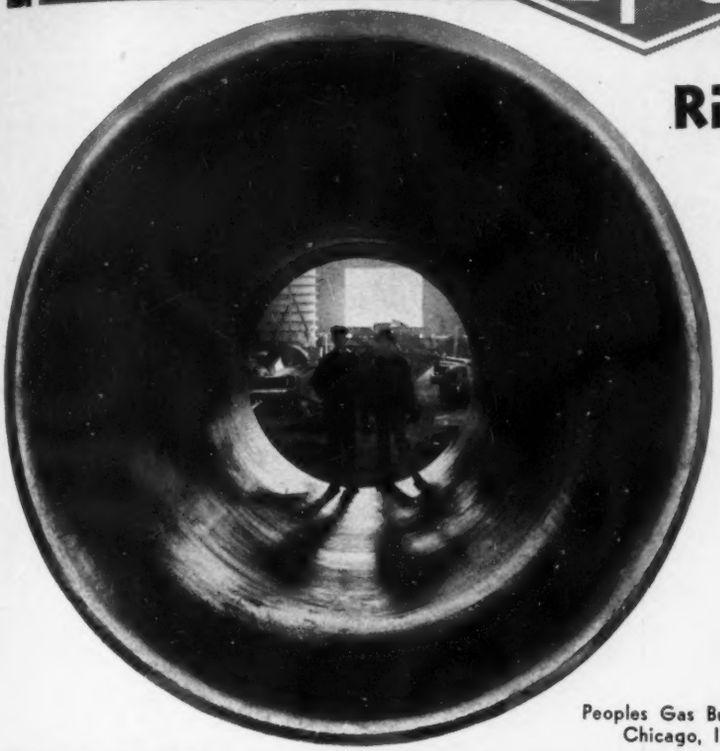

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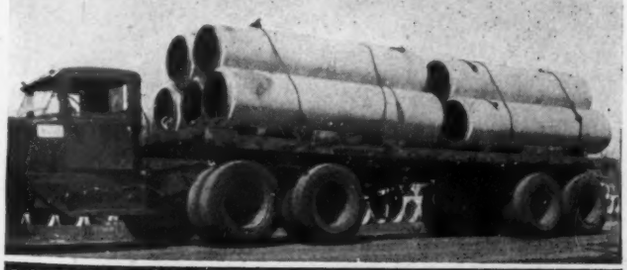

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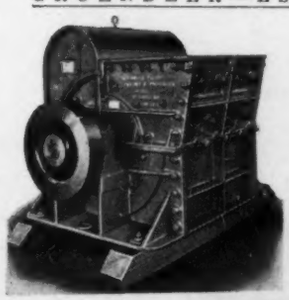

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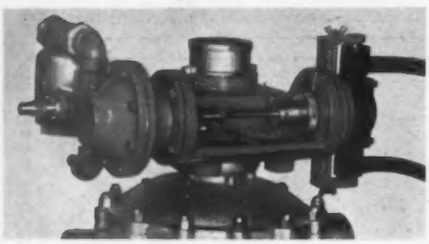

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A

A-B-C Mfg. Co. 137
*Activated Alum Corp. 128
Albright & Friel, Inc. 132
Alvord, Burdick & Howson 132
American Cast Iron Pipe Co. 130
American Water Softener Co. 131
Armco Culvert Mfgrs. Assn. 78
Arrowhead Iron Works 136

B

Black & Veatch 132
*Builders Iron Foundry 122
Burns & McDonnell Engr. Co. 132

C

Carborundum Co. 116
Cast Iron Pipe Research Assoc., The 104-105
Chain Belt Co. 121
Chester Engrs., The 132
*Chicago Bridge and Iron Co. 72
*Chicago Pump Company 80
Columbia Alkali Corp., The 73
Columbia Iron Works 136
Crane Co. 71

D

*Dorr Company, The ..... Third Cover
*Dresser Mfg. Co., S. R. 69

E

*Edson Corporation, The 136
Electro Bleaching Gas Co. 77
*Everson Mfg. Co. 127

F

*Faesy & Besthoff, Inc. 127
*Filtration Equipment Corp. ..... —
Ford Meter Box Co. 137
Fuller & McClintock 132
*Fuller Company ..... —

G

Gascoigne & Associates 132
General Paint Corp. ..... —
Greeley & Hansen 132
Gruendler Crusher & Pulverizer Co. 137

H

*Hellige, Inc. 137
Hill Associates, Nicholas S. 132
Hill, Hubbell & Co. ..... —

I

*Industrial Chemical Sales 103
*Inertol Company, Inc. ..... —
*International Filter Co. 135

J

Jung Hotel 135

K

Knowles, Inc., Morris 132

L

Layne & Bowler, Inc. 131
Link Belt Co. 133
Lock Joint Pipe Co. 137
Ludlow Valve Mfg. Co. 129
Lynchburg Foundry Company 135

M

Mabbs Hydraulic Packing Co. 136
*Mathieson Alkali Works, Inc., The 74
Metcalf & Eddy 132
Modern Iron Works 136
Monsanto Chemical Company ..... —
Mueller Co. 136

N

*National Water Main Cleaning Co. 136
Nussbaumer & Clarke, Inc. 132

O

Oliver United Filters, Inc. ..... —

P

Pacific Flush Tank Co. 137
*Pennsylvania Salt Mfg. Co. 70
Pirnie, Malcolm 132
*Pittsburgh-Des Moines Steel Co. . 75
*Pittsburgh-Equitable Meter Co. ..... Front Cover
Pomona Pump Co. 122
Potter, Alexander 132
Portland Cement Assn. 115
Proportioneers, Inc. 138

R

Riddick, Thomas M. 132
Roberts Filter Mfg. Co. 137
Royer Foundry & Machine Co. ... 76
Russell & Axon 132

S

*Simplex Valve & Meter Co. 106
South Bend Foundry Co. 136
Sparling, R. W. 130

T

Test Plug Mfg. Co. ..... —
Trohn's Supplies, Inc. 122

U

*United States Pipe & Foundry Co. ..... Second Cover

W

*Wallace & Tiernan Co., Inc. ..... Back Cover
Water Works & Sewerage 134
*Weston, L. A. 137
Whitman & Howard 132
*Wood Co., R. D. ..... —

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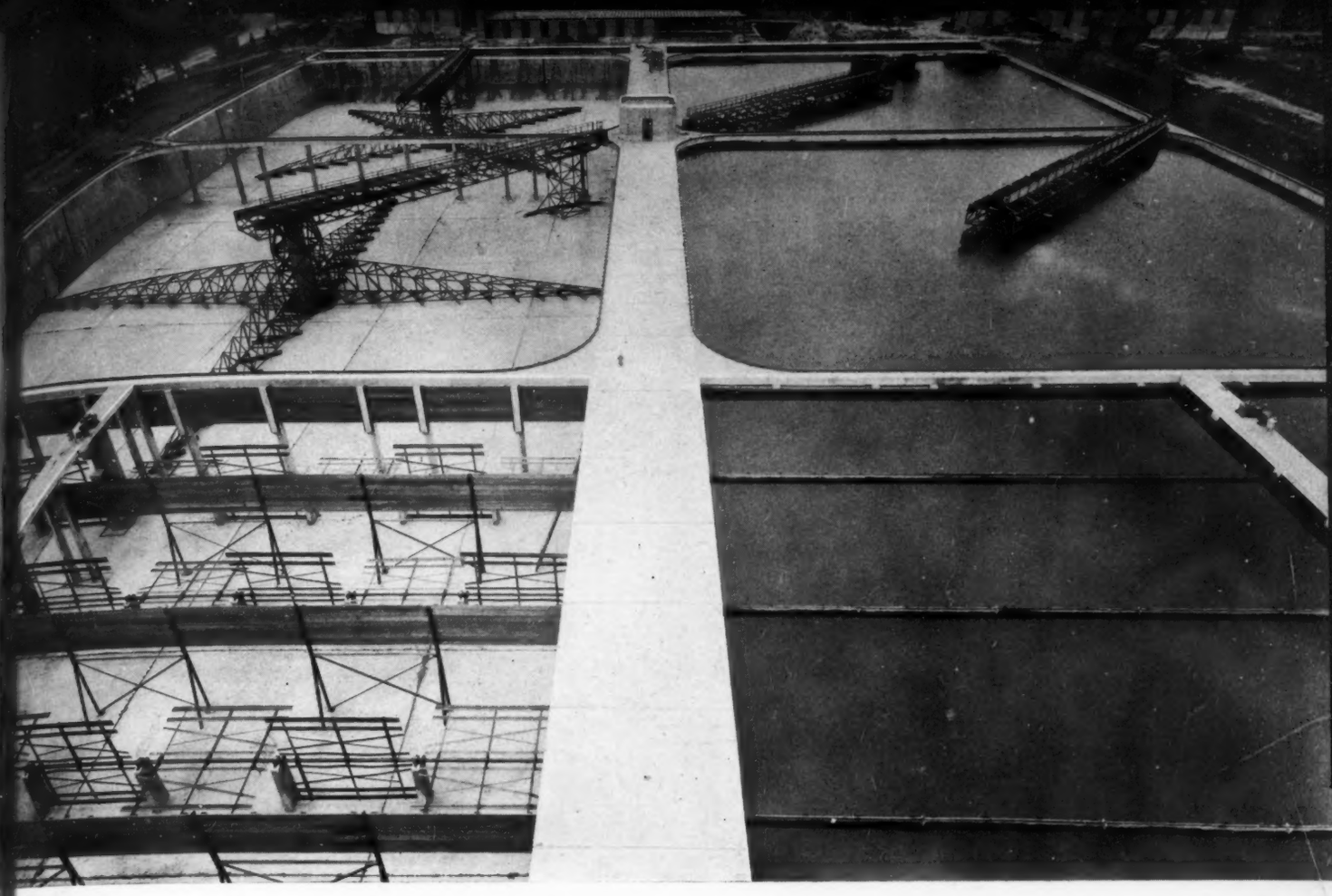

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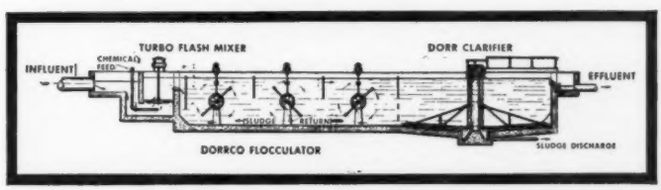

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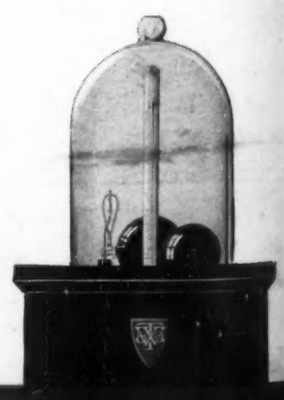

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